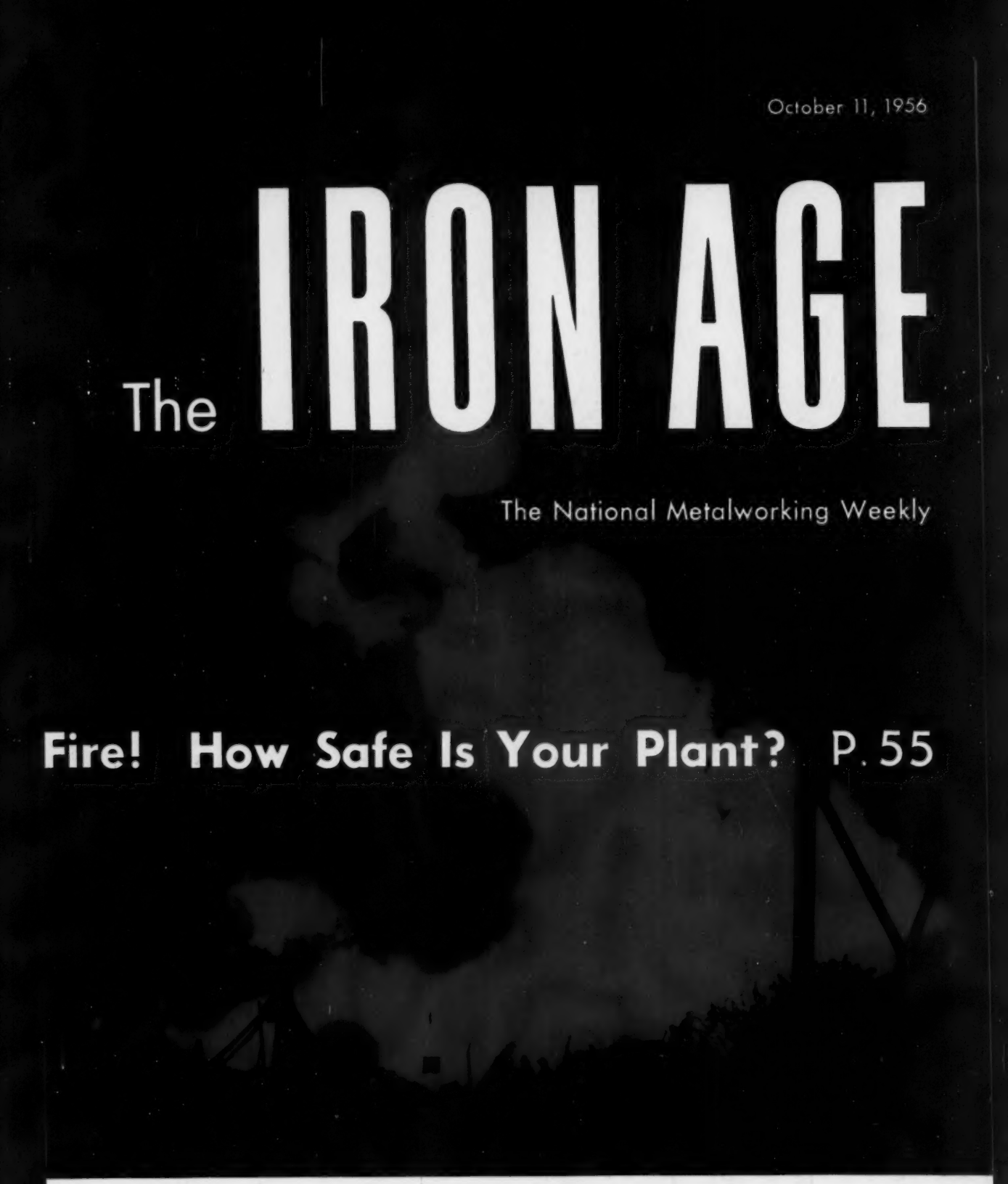
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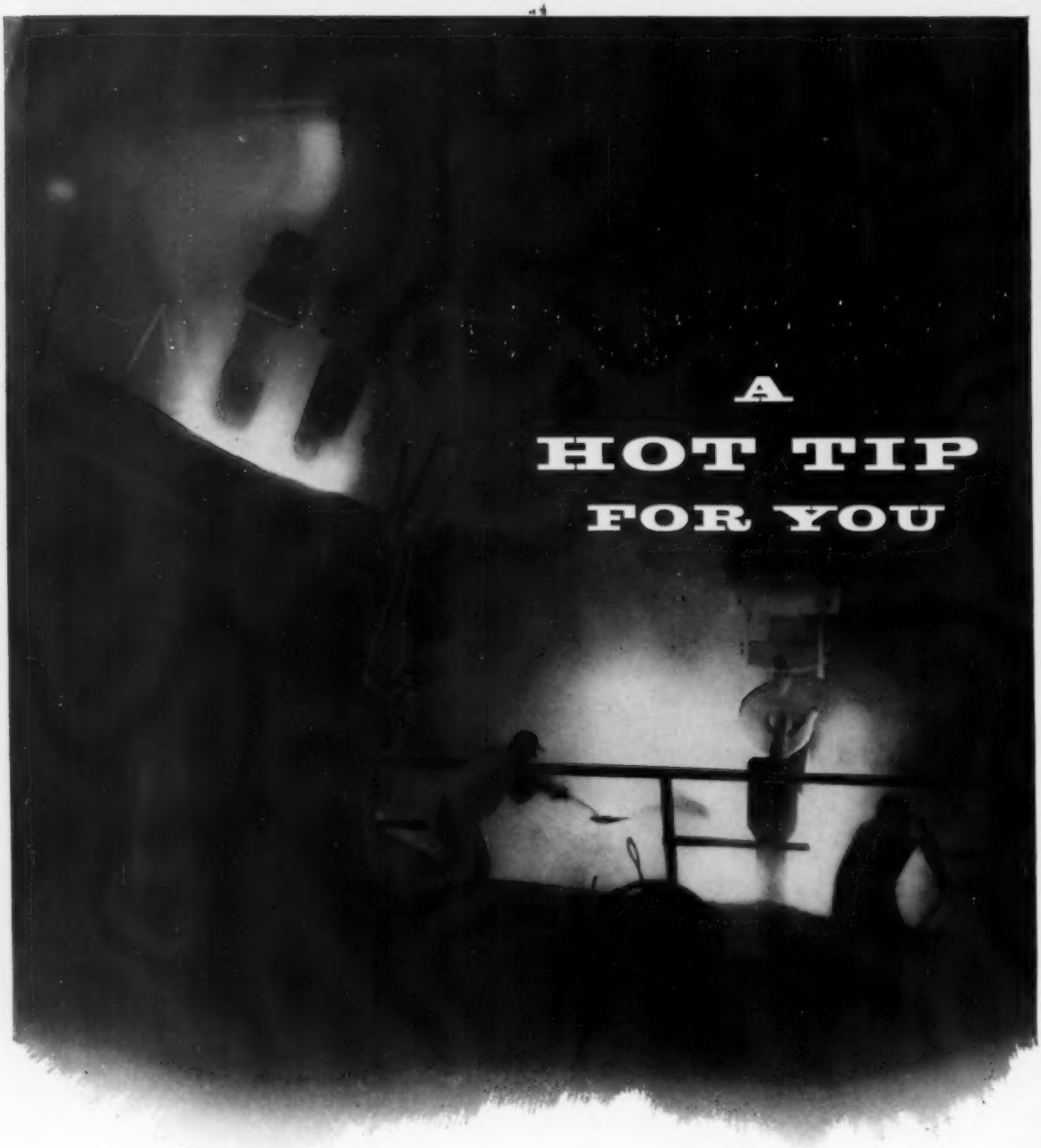
The IRON AGE

The National Metalworking Weekly



Fire! How Safe Is Your Plant? P. 55

Small Business: Do Company Planes Pay Off? P. 60
How To Use Fire-Resistant Hydraulic Fluids P. 95
Digest of the Week P – 2



● Electric arc furnaces represent the greatest degree of refinement of any steel-producing method. More rigid metallurgical controls are possible in the electric furnace and, therefore, assure you the highest, most uniform quality in your steel. A leader in the use of the electric furnace, Copperweld offers the most diversified selection of hot-rolled blooms, bars and billets of both leaded and unleaded alloy and carbon steels.

ARISTOLOY STEELS

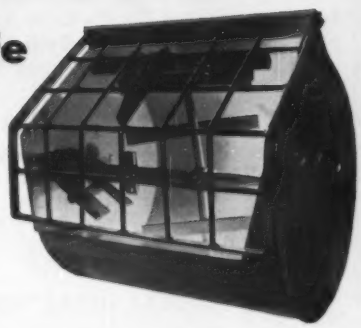
COPPERWELD STEEL COMPANY

Steel Division • Warren, Ohio

EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N.Y.



How Mayari R lengthened the life of these mixer drums



Mixing mortar or terrazzo in a machine like this one puts the steel mixing drum through quite an ordeal. In earlier models the abrasive action of the batch against the drum walls caused excessive wearing of ordinary carbon-steel drums.

For longer drum life the Muller Machinery Co., Inc., of Metuchen, N. J., decided to utilize the superior abrasion-resistance of Mayari R steel. Now, using Mayari R sheet as heavy as 4-gage, they rotary-shear it, multiple-punch it, roll-form it, and weld it into a drum that outlasts the previous drums of carbon steel. And Mayari R has proved to be as readily workable and weldable as the steel they had used before.

Abrasion-resistance is by no means the only advantage to be gained in using Mayari R high-strength, low-alloy steel. Its high yield point permits designs of greater strength or lighter weight. It has 5 to 6 times more resistance to atmospheric corrosion than plain carbon steel, and holds paint up to 80 pct longer.

Catalog 353 covers the Mayari R subject in complete detail. A copy may be obtained promptly by writing to the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mayari R...High-Strength, Corrosion-Resisting Steel

BETHLEHEM STEEL

DIGEST OF THE WEEK IN METALWORKING

Oct. 11, 1956—Vol. 178, No. 15

The IRON AGE

Digest of the Week in Metalworking

Starred items are digested at right.

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NEWS DEVELOPMENTS

NEW YORK TRIES SOFT SELL ROUTE TO SAFETY P. 58

In its efforts to beat down industrial accident rate, New York State adopts program of education and consultation. Enforcement not eased, but safety inspectors substitute advice for criticism. Small business biggest proportionate contributor to the accident toll.

MAGNESIUM IS MAKING GOOD ON ITS OWN P. 59

For the second year civilian consumption of magnesium topped military usage. Magnesium men see this as the culmination of its education and technological program. Predict even bigger things in immediate future. Advances in alloys and new techniques are credited for achieving the spurt.

DOES THE COMPANY AIRPLANE PAY OFF? P. 60

Empire Steel Castings is example of smaller foundry which found it does.



After buying plane the company developed new customers in distant states, was able to give better service to all its accounts.

FREIGHT CARS ARE GETTING TOUGH TO GET P. 62

Steel, coal and aluminum producers are among those hard hit by current car shortage. Need to ship more ore by rail this winter may make situation even worse. New car building races high attrition rate.



THIS FIRE in an Eastern storage warehouse cost $300,000. An expensive enemy, fire is a constant industrial threat. In "Fire! How Safe is Your Plant?" which begins on p. 55 you'll find a complete rundown on fire prevention methods, as well as on fire-fighting equipment and its use.

JASPER IRON ORE PELLETS ARE SHIPPED P. 63

Initial load is sent to Chicago area. Smaller and more fused than taconite they're product of new multi-million dollar, 600 thousand ton plant of Cleveland Cliffs Iron Co. near Republic, Mich. Processing costs higher than for taconite but offset by shorter haul to mills and easier crushing.

FEATURE ARTICLES

HOW TO INSTALL FIRE-RESISTANT HYDRAULIC FLUIDS P. 95

Switching from a flammable, petroleum-base hydraulic fluid to one of the fire-resistant types isn't difficult. But it does require more than just draining "most" of the former fluid from the system. There are recommended installation, maintenance procedures for each of the three basic fire-resistant fluid types. Careful attention to them will insure best results.

AISE STRESSES PRACTICAL POINTERS P. 98

New products, new processes and new ideas had one thing in common at the recent AISE Show in Cleveland. Each stressed the present practical aspects of an expanding steel industry. No elaborate claims were made for the future.

GET FASTER MACHINING FROM MAGNESIUM P. 100

When you have a choice of materials in machining a part, consider magnesium. Reports on its top machinability continue to roll in, not only on turning, but also on drilling and milling operations. Reduced machining time can frequently more than offset the comparably high cost of magnesium per pound. In one case, time saving halved total machining costs.

WHAT DO WE KNOW ABOUT HYDROGEN IN STEEL? P. 102

As a result of processing, hydrogen content in steel can become almost any steel user's problem, at one time or another. Last of a two part series. this article provides a summing up of virtually all that's known about hydrogen in steel. It surveys research highlights most important to both steelmakers and users.

NEW ADVANCES SWELL SHELL MOLDING USES P. 108

Confidence in shell molding's future continues to grow. Based on present and anticipated resin binder consumption, use of shell molds may double by 1958. Already, shell mold castings weighing 800 lb are reported. Metal sections 4 in. thick can be cast in ¼-in. shell molds. One-hundred-pound castings are now believed economically feasible.

MARKETS AND PRICES

INSTRUMENT INDUSTRY SET FOR EXPANSION P. 64

Last hectic decade of progress has seen measuring instrument sales double and capital outlays increase more than 150 pct. However the surface has hardly been scratched. Automation is stepping up the pace. Future will see even closer interlocked control systems for more coordinated process regulation.

WILL CHRYSLER'S BIG GAMBLE BE SUCCESS? P. 72

Firm spent $300 million for 1957 model changeover and will rely on restyling and sound product engineering to boost sales. Economies in new organizational setup will help offset costs. Company has made a concerted effort toward decentralizing its authority and making various divisions autonomous.

WILL MONEY SQUEEZE ANY TIGHTER? P. 77

FRB is privately worried because expansion borrowing hasn't slowed down. New increase in interest rates may be on the way. Businessmen are irked because government doesn't curb its own spending programs.

FAR WEST HAS A BUILT-IN EXPANSION FEATURE P. 79

It's area's rising rate of personal income—a barometer of increasing productivity among West Coast workers. This important motive force will be a factor in Farwest's favor and points to more expansion on the way.

PROBLEMS APLENTY FOR STEEL PRODUCERS P. 151

Business is good for the steel mills. But the producers have their problems, too. The freight car shortage is hindering shipment of steel and receipt of coal. Coal prices are up, squeezing earnings.

NEXT WEEK:

PLATING ADHESION: WHICH TEST DO YOU BUY?

As plating adhesion tests pile up, confusion seems to grow apace. Some standards for adhesion are obviously needed. But which? Next week's feature attempts to unscramble plating's No. 1 test muddle.



We say this without reservation—will back it up with proof:

New Balanced Mobil D.T.E. Oils Can Improve Your Production And Reduce Manufacturing Costs

For years Mobil D.T.E. oils have set the standard of quality for all hydraulic and circulating oils. Recently they were dramatically improved—so much so that their margin of superiority is now greatly increased.

New Mobil D.T.E. oils are *balanced* to meet the widest range of operating conditions. They will give years of trouble-free service—even in continuous high temperature circulating systems. They will keep your machines free from deposits over the complete range of service. They will give you the highest degree of protection against wear...rust...corrosion. In fact, tests show *most machines will become obsolete before these oils need changing* when operating at normal temperatures.

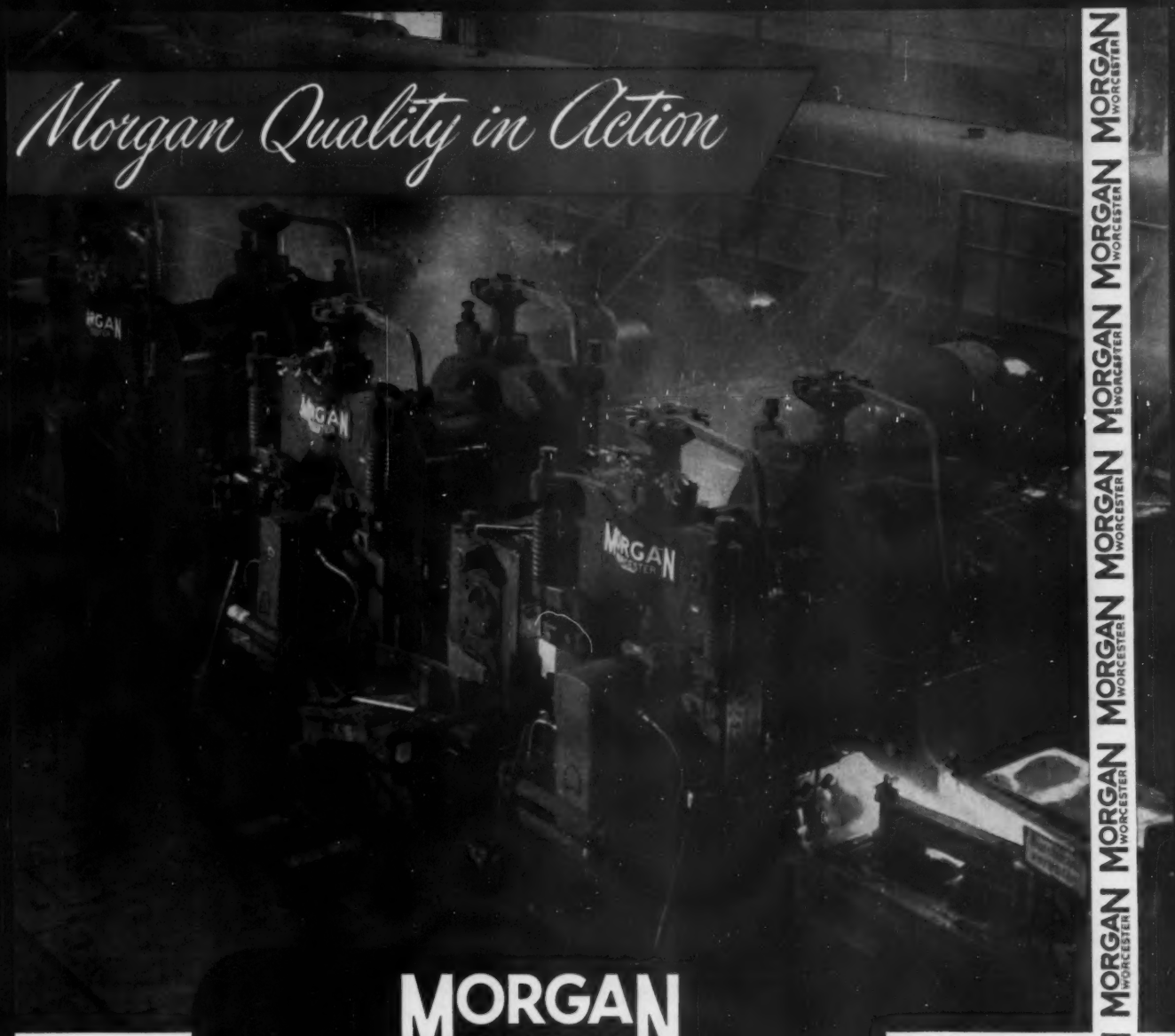
Let us show you concrete *proof* that new balanced Mobil D.T.E. oils can improve production and cut manufacturing costs. Ask your Mobil representative for the "balanced" story.



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FIRST STEP IN CUTTING COSTS

SOCONY MOBIL OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION



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WORCESTER

Billet and Sheet Bar Mill

Osesterreichisch-Alpine Montangesellschaft • Leoben-Donawitz, Austria

Whether abroad or at home in the United States, Morgan Mills are quality engineered and quality built to meet specific needs. Morgan's quality standards mean high production, greater accuracy and low cost per ton. It will pay you to talk to Morgan engineers.

MORGAN CONSTRUCTION CO.

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Armco Stainless in Jet Engine Spark Plugs

Fights Heat, Machines Better, Costs Less

Free machining "stabilized" Armco Stainless Steel bar stock replaced a high-nickel alloy in this right-angle jet engine spark plug. Here are three reasons why Armco 18-10 Cb-Ta FM Stainless Steel was chosen for the barrel around the ceramic:

1. **It withstands the heat and is stabilized against harmful carbide precipitation.**
2. **The *Armco Stainless Steel bars machine better*—special free-cutting elements are added.**
3. ***It costs less than the metal formerly used.***

Problem Solvers

Looking for a solution to a product-problem? One of the special grades of Armco Stainless Steel could be your answer. Armco's new precipitation-hardening grades, for example, are giving corrosion resistance and extra high strength and hardness to products of many kinds. Extra-low-carbon stainless steels produced by Armco give top protection to weld areas in equipment exposed to corrosive service.

Call the Armco Sales Office near you, or write to the address below for complete information about standard and special grades of Armco Stainless Steel.



Easy-to-machine Armco 18-10 Cb-Ta FM Stainless Steel (Type 347 F) forms the barrel around the ceramic on this jet engine spark plug. It replaces high cost high-nickel alloy. The plug's threaded end is Type 416 stainless; the flange is Type 430. **Photo courtesy Champion Spark Plug Company.**

ARMCO STEEL CORPORATION

2076 CURTIS STREET, MIDDLETOWN, OHIO

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • THE ARMCO INTERNATIONAL CORPORATION

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Indexed in the Industrial Arts Index and the Engineering Index.

BPA NBP

EDITORIAL

Is There Too Much Credit?

◆ THERE IS CONSIDERABLE opinion today about credit. Many experts claim credit extensions—especially installments—are too high. Influential people are quietly pressing for controls and arguing that the Federal Reserve Board ought to bear down harder.

Cooler heads believe that we don't know enough about credit to monkey around too much with the delicate balance of the economy. A detailed study is under way and will not be completed for some time. Until we know more about credit we can rely more upon the people's "feeling" about how far to go into debt.

They know more than the bankers do about debt. They know it from experience, not from statistics. Before anyone gets too smug about our credit setup a few thoughts are in order.

Years ago when most people rented we had nothing like the mortgage credit we have now. What used to be termed rent in the "other" column is now "debt." What's the difference between buying your home and renting it?

Repairs are made by installment payments. Years ago the owner took the renter's money and paid for repairs. Now it is called installment debt or mortgage debt when repairs are made. Here again the columns have changed but the work is the same.

What about autos? What about bus fare, street car fare or railroad fare? The latter are not shown as "debt." But the car—on time—replaces such transportation costs. Why call it all debt? It depends on what you call it.

When you see the "debt" covering washing machines and driers do you remember that many people used to use laundries, or hired help? Then it was not installment buying, it was cash. But appliances—on time—have supplanted the old-time laundry activity.

Consumption versus stagnation might also explain why we have more credit today. It will be paid off. It always has been paid off during good times and bad. We are still exchanging our services for what we "want."

Before we go hog-wild on "expert" credit advice, let's learn more about it. It may not be too high at all.

Tom Campbell

EDITOR-IN-CHIEF

In 9 short years the Chambersburg CECO-DROP has become the standard gravity drop hammer of the forging industry. Some of the reasons for this astonishing success are these:

1. The Ceco-Drop is a proven tool, the original "Boardless Board Drop Hammer," with world wide acceptance.

2. More than 400 Ceco-Drops are in service in 119 forge shops all over the world. Many companies have initiated programs looking toward complete conversion to Ceco-Drops.

3. The Ceco-Drop has created new standards of performance, and established new standards of tolerance in drop forgings.

4. The Ceco-Drop minimizes leg fatigue in drop hammer operation. Hammermen prefer the Ceco-Drop.

5. The Ceco-Drop costs less to maintain, has fewer, more durable parts. Automatic lubrication prolongs parts life.

6. The Ceco-Drop is economical to operate. Air or steam is used only when the hammer is running.

7. The Ceco-Drop forges more minutes per hour. (Once it is set-up, just turn on the air or steam and forge.) It does more forging per blow, requires no board changes, no friction adjustment.

8. The Ceco-Drop is safer . . .The operator's station is clear. There are no overhead hazards. It has fewer, lighter mechanisms. It has a safety dog and safety cylinder cover. Power failure stops the hammer and clamps the ram.

9. The Ceco-Drop requires less die set-up time. Die changes are quicker, easier. It takes but a minute to adjust the stroke.

10. The Ceco-Drop has a wide range of operation due to the unique short stroke adjustment and control.



CECO-DROP

U. S. PATENT NO. 2,604,071, JULY, 1952 . . . OTHERS PENDING
CECO-DROPS HAVE BEEN BUILT IN SIZES FROM 500 LBS. TO 8000 LBS.

Builders of THE IMPACTER
"FORGING IN MID-AIR"

CHAMBERSBURG ENGINEERING CO. • CHAMBERSBURG, PENNA.

dear editor: *letters from readers*

Grease Monkeys

Sir:

Could you please send me four (4) or five (5) copies or tear sheets of the article "Over Lubrication Shortens Anti-Friction Bearing Life."

This is a most informative and interesting article and all too true. Apparently most "grease monkeys" assume that if a pint is good then a gallon is better. Word of mouth education does not always take effect. I hope the written article may do it. *C. W. King, Gen. Supt., Steel Plant Section, Acme-Newport Steel Co., Newport, Ky.*

Time Study

Sir:

I read with interest the article, "How to Take a Machine Shop Time Study," by R. A. Ratner, Asst. Prof. of Mechanical Engineering, University of Wisconsin, Madison, Wisc., in the September 13 issue of THE IRON AGE. It will be appreciated if a reprint of the article can be forwarded to me at the Management Engineering Branch, Joliet Arsenal, Joliet, Illinois.

This article is timely, in that we can use it in the training of Time Study Engineers. Permission is requested to reprint locally the article for use as handouts to the engineers receiving training. *J. A. Bach, Joliet Arsenal, Joliet, Ill.*

Permission granted.—Ed.

Oxygen Steelmaking

Sir:

In your March 31, 1955, issue of THE IRON AGE, you had several articles on Oxygen Steelmaking. We are interested in securing more information on this subject.

We have a small rail rerolling mill and produce steel reinforcing bars. Under consideration at present is melting capacity to produce billet sized ingots from 127 to 600 lb. Up till now we have only thought in terms of an electric furnace.

However, viewing recent developments in oxygen steelmaking practice, we would like to investigate the possibility of making steel with a converter. This would be a completely new plant since we have no melting facilities at present. Hot metal would have to come from a cupola.

Requirements would be as follows with room allowed for expansion: Tonnage—60 tons per 24 hrs; type steel—carbon only range 0.20 to 0.80; scrap available—No. 1 heavy melting, low phos.; bundles; product—billet sized ingots 127 to 600 lb; hot metal—cupola. *M. Selig, Structural Metals, Inc., Seguin, Texas.*

An oxygen installation sounds impractical for the steel tonnage you have in mind. At McLouth Steel, for example more than 60 tons of steel have been made in a single converter in one hour.—Ed.



THE IRON AGE

8 tons of power!



for...
Bending
Curling
Box Forming
Corrugating
Punching
Blanking
Hemming
Flattening

NEW DI-ACRO* PRESS BRAKE

Eliminate tie-up of a large press brake on short-run production jobs with the new Di-Acro Press Brake. It's quickly set up for experimental engineering, too. Hand operated—ample power is provided for average use by a simple cam lever mechanism, plus a power multiplying ratchet drive for heavy forming jobs.

New Di-Acro Press Brake forms 16 gauge mild sheet steel across the full 24" forming width, 10 gauge mild sheet steel across a 12" width as well as other ductile materials. Available with standard dies and specials—both are interchangeable with other press brakes.

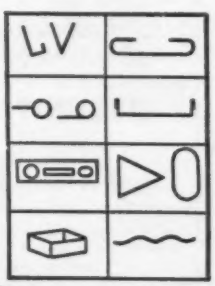


Diagrams below illustrate typical operations with a Di-Acro Press Brake and its remarkable versatility.

WANT MORE INFORMATION

New catalog gives complete details on all hand and power operated Di-Acro machines.

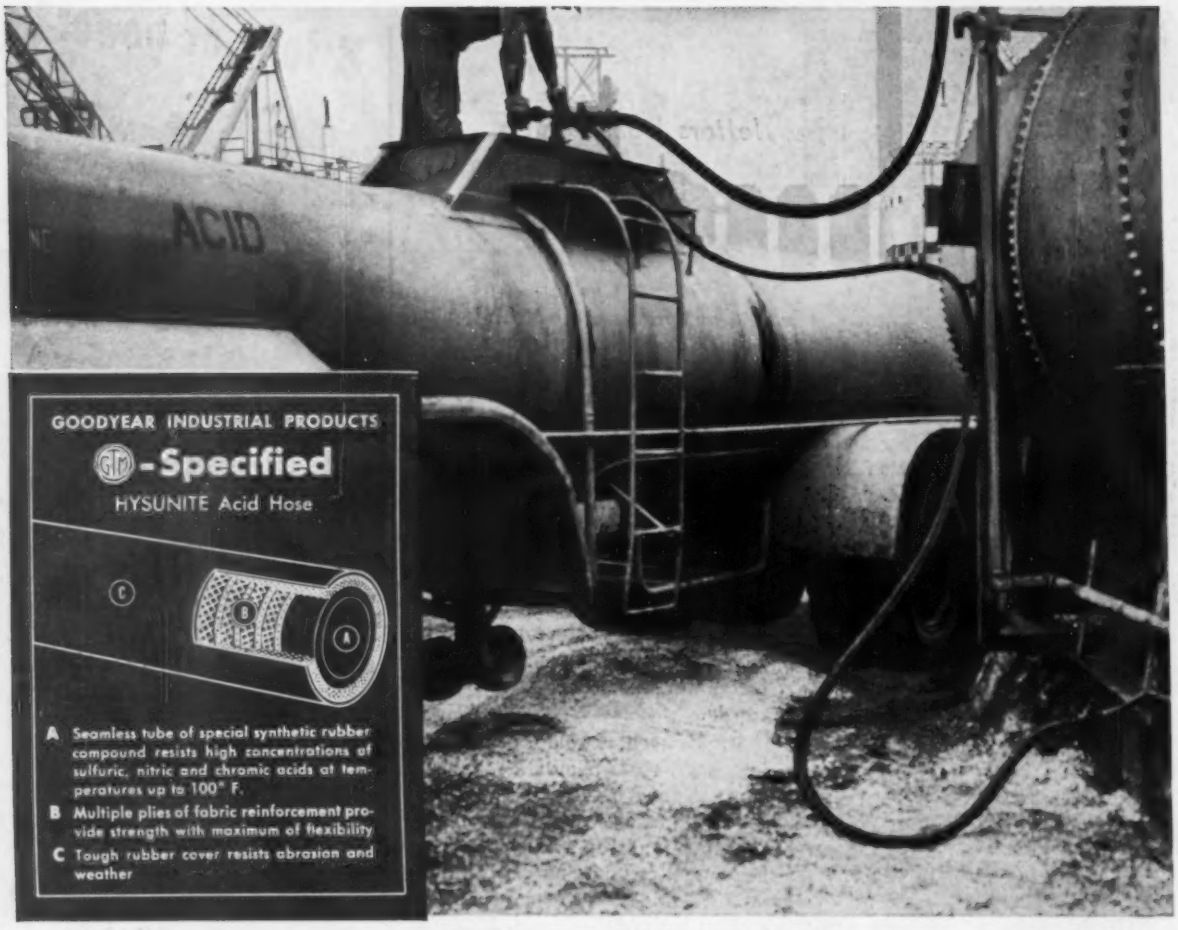
See Di-Acro Exhibit Booth No. 1410, National Metal Exposition, Oct. 8-12, 1956, Cleveland Public Auditorium, Cleveland, Ohio.



di-acro PRECISION METALWORKING MACHINES

*Pronounced Die-ack-ro

O'NEIL-IRWIN MFG. CO.
302 8th Ave.
LAKE CITY, MINN.



G.T.M. increases acid hose life by 900%

ACID—66° Baume Sulfuric—was the problem at this eastern steel mill. Many types of hose were tried for its transfer from truck to storage tank. But the best hose delivered *only 2,500,000 lbs.* of acid, before embrittling and breaking.

Then the G.T.M.—Goodyear Technical Man—recommended his new HYSUNITE Hose, specifically developed to handle highly oxidizing acids in high concentrations at temperatures up to 100° F. This rugged hose handled a fabulous *26,500,000 lbs.* of acid—was good for many more pounds—when it was removed from service for thorough checking.

If you have hose problems, it will pay you to consult your Goodyear Distributor and/or the G.T.M. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

HYSUNITE HOSE by

Hysunite—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

GOODYEAR

THE GREATEST NAME IN RUBBER

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

fatigue cracks

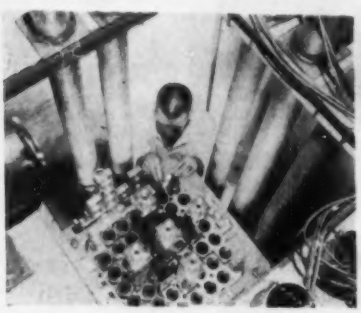
Block That Kick

One of the pleasanter aspects of our editor's jobs is their chance to meet top-flight engineering, production and sales people in the many companies they visit in the course of reporting and writing.

And not too surprising is the very human qualities they find in the people they meet. It seems no matter how far we advance technologically, people are still people.

A good case of this is the visit one of our men recently made to the new nuclear labs of Alco Products, Inc. in Schenectady. Here, Alco tests reactor cores for the Package Power Reactor it's building for the Army at Fort Belvoir, Va. (see IRON AGE, Sept. 27, p. 174).

Editors were given a tour of the lab's reactor room and the supporting facilities needed in a project of this kind. During the tour the editor on the scene was quite impressed by the staff of young and very competent nuclear engineers and scientists working under Dr. Larry Meem, Chief Nuclear Scientist at the lab.



Reactor Core At Alco

All were very bright, quick with clear answers to questions and obviously attached to their work. This got our man to thinking as to just what kind of fellows they were. Were they so involved with nuclear matters that they couldn't appreciate the things which appeal to most of us?

He got his answer in one of the small test rooms next to the reactor. As he walked in he saw a large chart on a far wall. Probably a table of elements or something, he thought. As he got closer he made it out. It read: 1956 ASSOCIATED PRESS FOOTBALL SCHEDULE.

IA and Parisian Parfums

And just to show how fancy we can get, we received a call last week from a New York representative of the Coty perfume people in Paris asking for more information about one of our technical articles.

We switched this one over to the editors fast but couldn't get back to work till we found out what was going on.

It seems one of the Coty people in Paris read the article "No-Heat Adhesives Simplify Joining Problems" in our July 19 issue. They wanted to know more about the adhesives, who made them (Rubber & Asbestos Corp., Bloomfield, N. J.), supply, etc.

Their problem it developed, was labels—and affixing of same in the form of paper and sometimes foil, to glass, plastics and other materials. Some of their adhesives, they found, tended to crystallize and fall off.

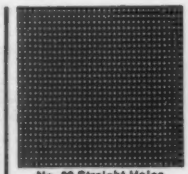
Since we are of the school which can't tell the $20 stuff from the $2 stuff without labels, we could appreciate the problem.

New Puzzler

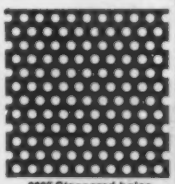
Mr. William R. Jenkins, United Engineering and Foundry Co., Pittsburgh, says, "consider the earth girded at the equator by an iron band that fits snug. Split this band at any point and add an additional 38 inches to it. Will this action make any noticeable difference in the snug fit of the band around the earth?"

Perforated Materials for *Every* Application

Contact H & K for any perforated materials your product may require.

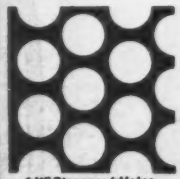


No. 00 Straight Holes
950 holes per sq. in.
.020" diam. 30% open.



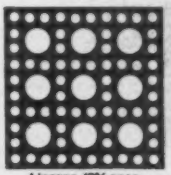
.060" Staggered holes.
126 holes per sq. in.
3/32" centers. 36% open.

We have tools for perforating thousands of different patterns.



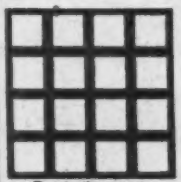
1/4" Staggered Holes.
5/16" centers.
.25" diam. 58% open.

We will be glad to work with you on your perforating problems.



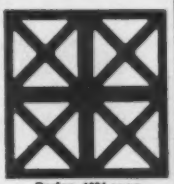
Lincane 47% open

See our catalog in Sweet's Product Design File.



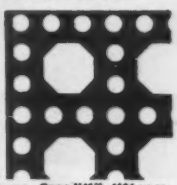
Two-tenths square,
64% open.

Perforating all metals, Masonite, plywood, paper, cloth and plastic.



Perfex 40% open

Round holes, square holes, slots, ornamental patterns, oblong holes, oval holes.



Cane "41" 41% open.

Fill-in and mail coupon to office and warehouse nearest you.

THE Harrington & King PERFORATING CO.

Chicago Office and Warehouse
5619 Fillmore Street
Chicago 44, Ill.

New York Office and Warehouse
118 Liberty Street
New York 6, N. Y.

Please send me—

- ☐ GENERAL CATALOG NO. 62
- ☐ STOCK LIST of Perforated Steel Sheets
- ☐ SAMPLES of Perforated Plastics and Paper
- ☐ PRICE INFORMATION (NOTE. Send specifications of perforated materials wanted. If necessary send drawings or sketches.)

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TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE_____ STATE_____

CINCINNATI
BICKFORD
SUPER SERVICE
Radials



For faster metal drilling . . .

This ultra-modern head . . . CHARTS and PRE-SELECTS PROPER SPEEDS and FEEDS

You chart, you control, you speed up operations and have a record for reference with this advanced head. The prescheduling chart plans sequence of operations and is a complete guide for the operator. Instant, quiet, hydraulic selection and changes of 36 speeds and 18 feeds are preselected by two convenient, easily read dials. Controls for clamping of column, arm and head, and arm elevation by power are at the operator's finger tips.

Built in 4 foot to 8 foot arm, 13 inch to 19 inch column. Spindle speeds may be as low as 8 RPM or as fast as 1750 RPM.

Write for Bulletin R-33 describing this ultra-modern tool

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SUPER C B SERVICE

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RADIAL AND UPRIGHT DRILLING MACHINES

CINCINNATI BICKFORD DIVISION

GIDDINGS & LEWIS MACHINE TOOL COMPANY

OAKLEY, CINCINNATI 9, OHIO, U.S.A.

dates to remember

OCTOBER

American Society Of Civil Engineers—Commercial exhibit and national convention, Oct. 14-18. Society headquarters, 33 W. 39th St., New York.

American Machine Tool Distributors' Assn.—Annual meeting, Oct. 15-16, Broadmoor Hotel, Colorado Springs. Assn. headquarters, 1900 Arch St., Philadelphia.

Rail Steel Bar Assn.—Semi-annual meeting, Oct. 15-16, Sheraton-Mount Hotel, Montreal, Canada. Assn. headquarters, 38 S. Dearborn St., Chicago.

American Gas Assn.—Annual convention, Oct. 15-17, Atlantic City, N. J. Assn. headquarters, 420 Lexington Ave., New York.

The Office Executives Assn.—Annual national business show, Oct. 15-19, New Coliseum, New York.

EXPOSITIONS

National Industrial Exposition & Management Conferences—Oct. 22-26, Detroit.

Society Of Industrial Packaging And Materials Handling Engineers—Oct. 23-25, St. Louis.

Third International Automation Exposition—Nov. 26-30, New York.

The Institute Of Management Sciences—Third annual international meeting, Oct. 18-19, Hotel Statler, Los Angeles. Society headquarters, 336 N. Foothill Rd., Los Angeles.

Foundry Equipment Manufacturers Assn., Inc.—38th Annual Meeting, Oct. 18-20, Greenbrier Hotel, White Sulphur Springs, W. Va. Society Headquarters, Suite 202, One Thomas Circle, Washington 5, D. C.

Conveyors Equipment Manufacturers Assn.—23rd annual meeting, Oct. 20-23, The Greenbrier, White Sulphur Springs, W. Va. Society headquarters, One Thomas Circle, Washington, D.C.

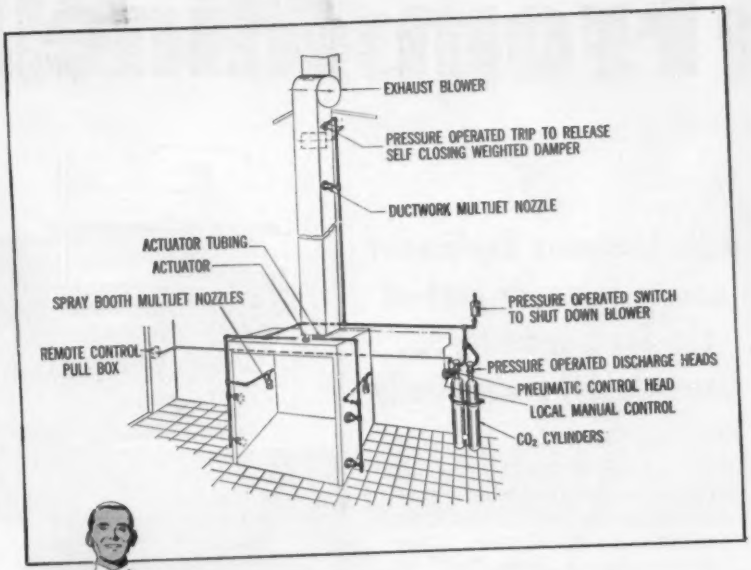
American Standards Assn.—Annual meeting, Oct. 22-24, Roosevelt Hotel, New York. Assn. headquarters, 70 East 45th St., New York.

Aluminum Warehouse Assn.—Annual meeting, Oct. 24-26, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, 1900 Arch St., Philadelphia.

American Zinc Institute, Inc.—Fall meeting, Oct. 25-26, The Royal Connaught Hotel, Hamilton, Ontario. Society headquarters, 60 East 42nd St., New York.

American Gear Manufacturers Assn.—Semi-annual meeting, Oct. 27-31, Edgewater Beach Hotel, Chicago. Assn. headquarters, One Thomas Circle, Washington, D. C.

Gray Iron Founders Society, Inc.—Annual meeting, Oct. 30-Nov. 2, The Homestead, Hot Springs, Va. Society headquarters, 930 Nat. City-E 6th Bldg., Cleveland.





AUTOMATIC FIRE PROTECTION... ENGINEERED FOR SPRAY BOOTHS!

SPRAY BOOTHS can be tricky—safe one minute, ablaze the next. Because they are a special kind of fire hazard, spray booths demand a special kind of *fire protection*. Like a Kidde *Automatic* CO_2 Fire Extinguishing System.

By means of rate-of-temperature-rise detectors, a Kidde system spots—and smothers—even the most vicious blaze the instant it begins . . . pouring clouds of CO_2 over the flames through wide-dispersion Multijet nozzles.

Thanks to the nature of clean, efficient CO_2, a Kidde system leaves no mess to clean up. CO_2 will not harm production equipment or work-in-process . . . it snuffs the fire, then vanishes.

Furthermore, Kidde systems are of the most *advanced* design. They use no falling weights, no old-style mechanical triggering methods. Instead, Pneumatic Control Heads insure an instant and complete discharge of CO_2.

In Kidde tamperproof systems, each moving part is self-enclosed—a safety measure to prevent accidental discharge. And easy-to-read visual indicators show quickly whether the system is "set" or "released." Finally, there are special Directional Valves which let you protect more than one hazard from the same bank of cylinders—a feature that means the most versatile of fire protection.

For more information on the best in fire extinguishing systems, and help in solving your specific fire problems, write Kidde today.

Kidde

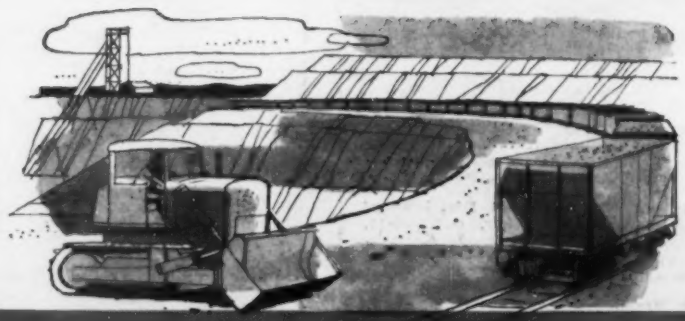
Walter Kidde & Company, Inc.
1049 Main Street, Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd., Montreal—Toronto

From Mine to Mill

Allis-Chalmers Equipment serves in every part of the Steel Industry... Dependably, Economically

For more than three quarters of a century, Allis-Chalmers has served the steel industry — supplying the equipment needed to produce top quality steel ... the manufacturing "know-how" to meet heavy-duty operating conditions ... the pioneering spirit to keep up with the changing requirements of the industry. Allis-Chalmers machines are employed, not just in one phase, but all through the steel-making process. For complete information on how Allis-Chalmers can help solve your machinery problems, consult your Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wis.

Regulex and Texrope are Allis-Chalmers trademarks.



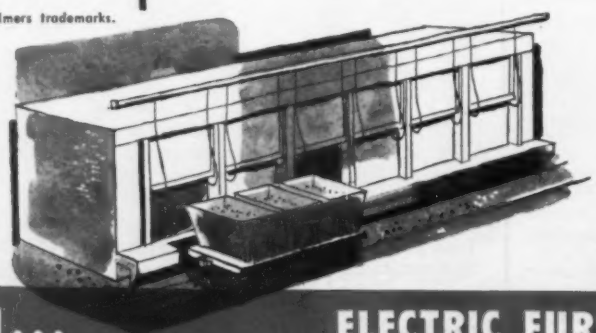
MINES...

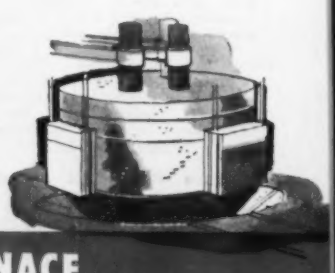


Crushers, grinding mills, vibrating screens engineered and manufactured by Allis-Chalmers crush the ore-bearing rock, grind it to specified size, size and wash metallic ores, stone and coal.



Allis-Chalmers pumps, motors, Texrope drives are in wide use throughout the metal industry because of their long life characteristics, low maintenance requirements and great versatility.





OPEN HEARTH... **ELECTRIC FURNACE...**



Mercury-arc rectifiers furnish constant voltage dc power for material handling in open hearth and other mill operations and for mine haulage. Variable voltage units are supplied for supporting main roll drives.



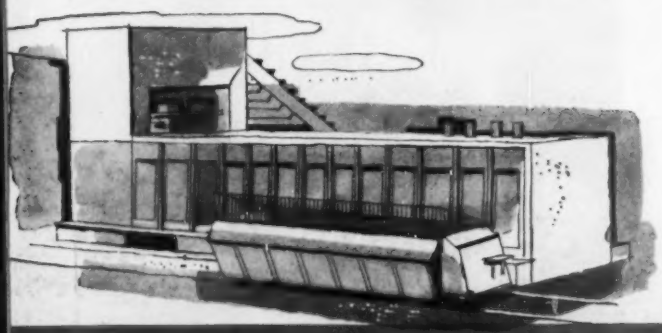
Allis-Chalmers arc furnace transformers are of well-balanced design and extra heavy duty construction — proven in 25-30 years of repeated daily short-circuits in electric furnace operation.

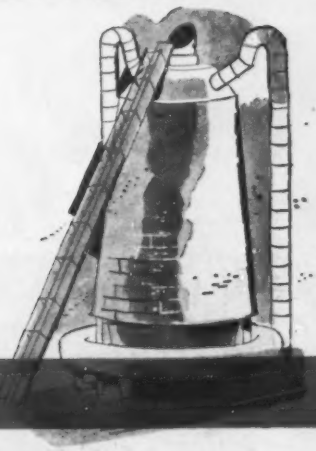


***Regulex* control** balances arc current with arc voltage, almost instantly — maintains desired arc condition automatically.

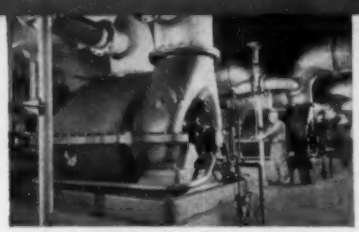
ALLIS-

. It's Allis-Chalmers





COKE OVEN... BLAST FURNACE...



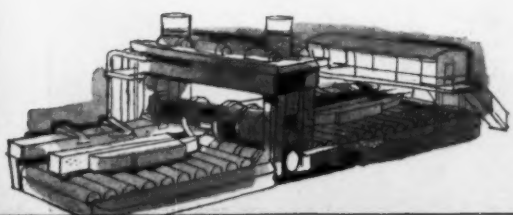
Booster, exhauster or combination service requirements are met by Allis-Chalmers blowers. Photo shows four 23,000-cfm, 5100-rpm, 3.5-psig centrifugal exhausting blowers in a western steel mill.

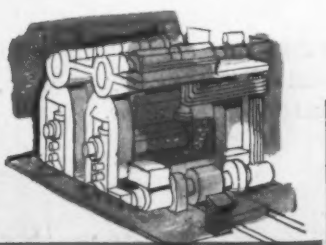


Blast furnace blowers furnished by Allis-Chalmers meet blast furnace requirements. The 75,000-cfm, 30-psig centrifugal blower shown here has been in service since 1942. It is driven by an 8500-hp steam turbine.



Allis-Chalmers axial blowers are designed for high efficiency blast furnace duty. They are smaller, easier to install — save $50,000 or more in steam per year. A-C also builds constant efficiency rotary compressors.





BLOOMING MILL... FINISHING MILLS...



Motor room photograph shows Allis-Chalmers switchgear, control, constant and variable voltage motor-generator sets, *Regulex* m-g sets, liquid rheostat, and twin-drive motors in use in a midwestern steel plant.



Hot strip, cold reduction, temper, rod and wire mills, and annealing and pickling lines employ Allis-Chalmers control, power equipment and drive motors for dependable operation.

Other Equipment

Besides the power utilization and conversion equipment illustrated, Allis-Chalmers also supplies power generation and distribution requirements from mine to mill.

For power generation, A-C builds steam turbine-generator units, surface condensers, water conditioning equipment, pumps, motors, and control. Also hydraulic turbines, generators, governors, and valves. For power distribution, A-C furnishes transformers, voltage regulators, circuit breakers, switchgear, and substations.

Throughout this wide range of products, you can depend on Allis-Chalmers for equipment engineered to meet your exact needs.

CHALMERS

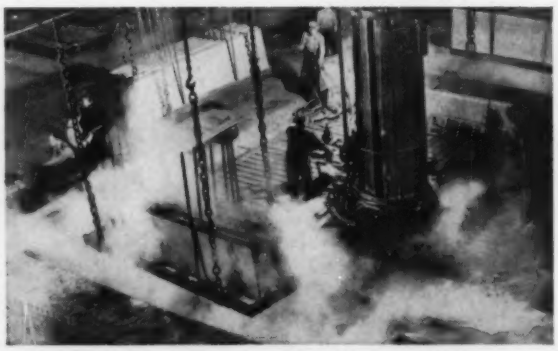
A-C ALLIS-CHALMERS

A-4907

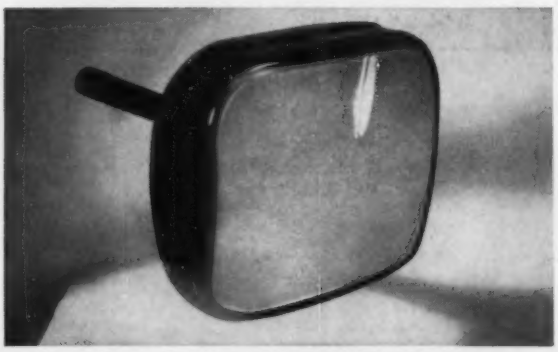
ANHYDROUS Hydrofluoric Acid for alkylation catalyst; also catalyst and fluorinating agent in many other organic and inorganic reactions.

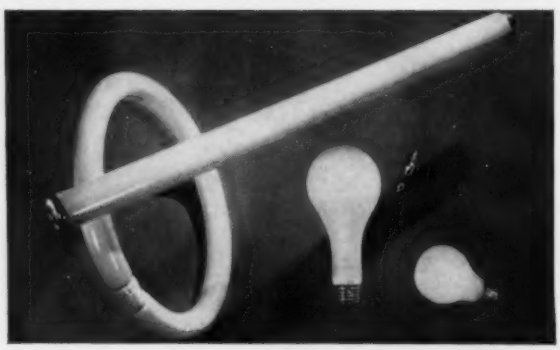


AQUEOUS Hydrofluoric Acid for steel pickling, glass frosting and etching; also for electropolishing of metals, ore flotation, manufacture of other chemicals.



For "HF" Call GENERAL





YOUR CONVENIENT SOURCE OF SUPPLY: In the East, Midwest and California, 7 General Chemical supply points place stocks within convenient shipping distances.

Producing Works:

Marcus Hook, Pa.
(near Philadelphia)
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Chicago, Ill.
Cleveland, Ohio
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(Los Angeles)
Pittsburgh, Pa.

As a major producer of Hydrofluoric Acid since the turn of the century, General Chemical has extensive experience in the manufacture and industrial applications of Hydrofluoric Acid, both aqueous and anhydrous, and its many fluorine chemical derivatives.

For your requirements—or for product information or helpful technical service—just phone or write the nearest General Chemical office listed below.

First in fluorides

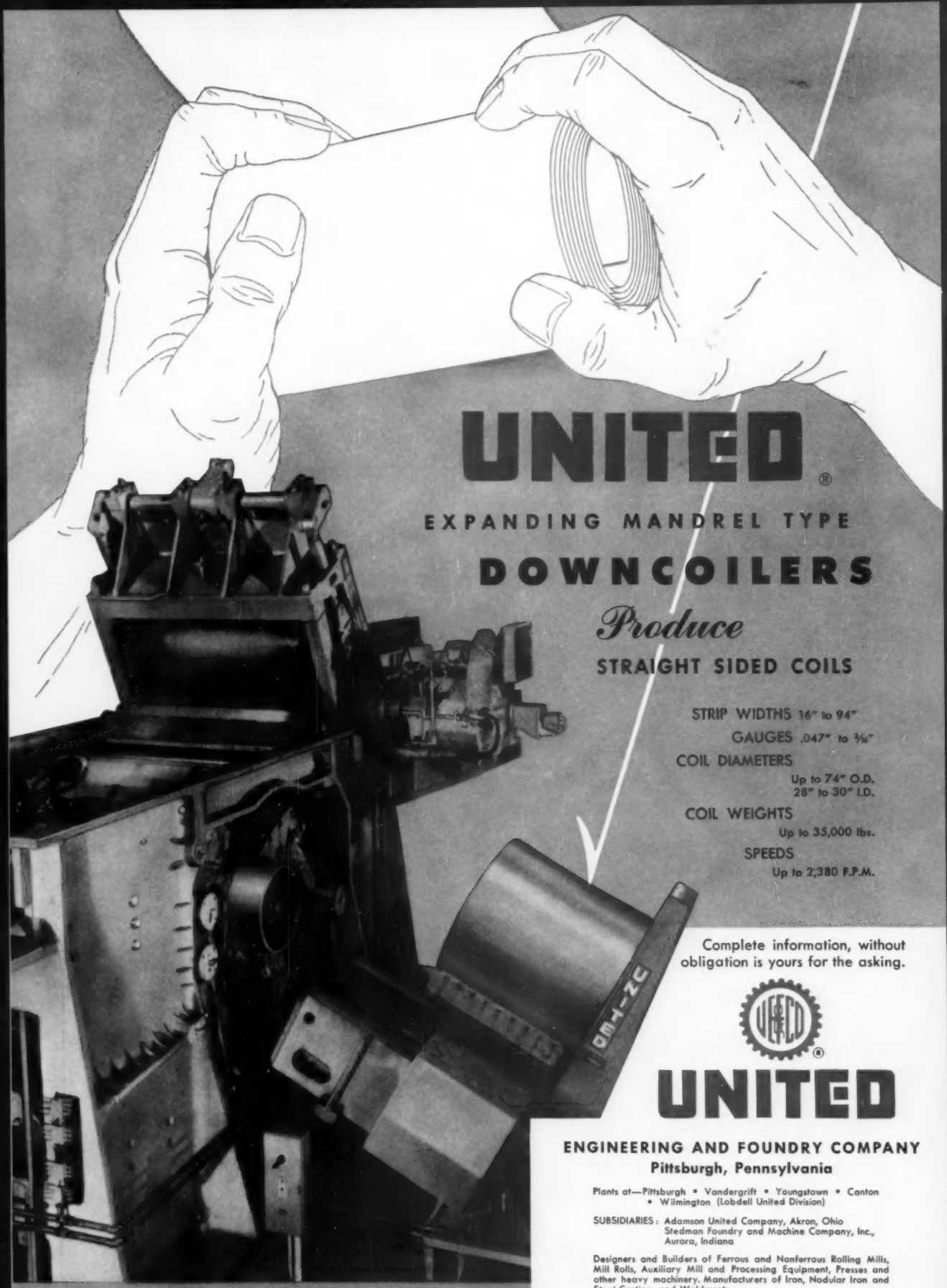
GENERAL CHEMICAL DIVISION

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UNITED®

EXPANDING MANDREL TYPE

DOWNCOILERS

Produce

STRAIGHT SIDED COILS

STRIP WIDTHS 16" to 94"

GAUGES .047" to 3/16"

COIL DIAMETERS
Up to 74" O.D.
28" to 30" I.D.

COIL WEIGHTS
Up to 35,000 lbs.

SPEEDS
Up to 2,380 F.P.M.

Complete information, without obligation is yours for the asking.

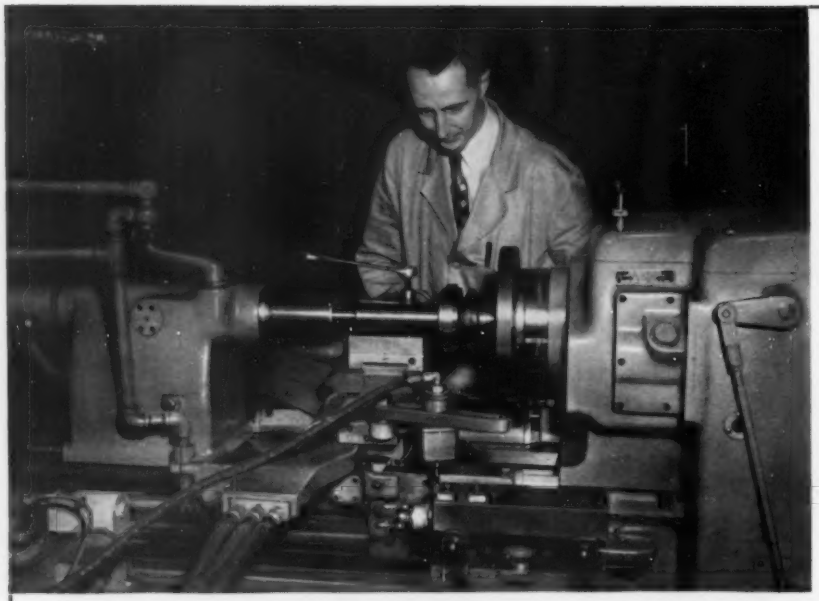
UNITED

ENGINEERING AND FOUNDRY COMPANY
Pittsburgh, Pennsylvania

Plants at—Pittsburgh • Vandergrift • Youngstown • Canton • Wilmington (Lobdell United Division)

SUBSIDIARIES: Adamson United Company, Akron, Ohio
Stedman Foundry and Machine Company, Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

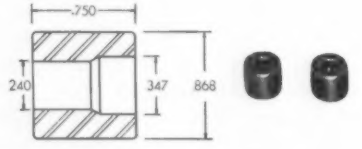


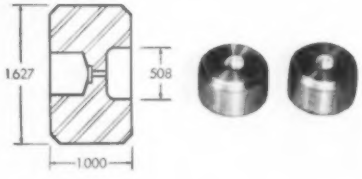
Finish turning operation on a hi-speed steel heading die, using a Monarch 13" Series 61 Air-Gage Tracer Lathe, .015" stock is removed within a limit of ±.0005". Turning time is 15 minutes compared to 2 hours previously required on a conventional engine lathe.

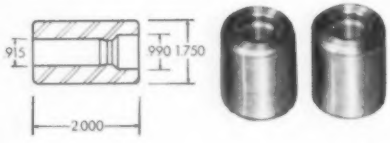
WITHOUT MONARCH–TIME'S A-WASTING!

Air-Gage Tracer Lathes Cut Contouring Time from 2 Hours to 15 Minutes — ± .0005"!

Group of typical heading dies which are finish bored on the 10" Model EE Air-Gage Tracer machines. Drawings show complexity of work. Under the same conditions as above, the same time savings are realized.







Can you ignore savings like these reported by Standard Pressed Steel Company?

They use a battery of Monarch Air-Gage Tracer lathes in their production toolroom for finishing operations on small forging dies. Most of the work is contour boring to exceptionally close limits plus quite a variety of contour turning.

The machines go sixteen hours per day, six days per week. Monarchs were chosen because of Standard Pressed Steel's previous satisfaction with this make of lathe. The Monarch flame hardened, precision ground bed ways are considered a must in this plant. These tracer controlled lathes are much faster and more accurate than the conventional engine lathes previously used and more uniform in performance.

Now, check over the job reports in the picture captions. Two hours cut to fifteen minutes! You're right — you can't ignore savings like these! Write now for our Booklet # 2608... **The Monarch Machine Tool Company, Sidney, Ohio.**

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

FOR A BETTER TURN FASTER ... TURN TO MONARCH

Get the service you need!

Call Rotary

EXPANDED SIZE RANGE

hexes	rounds	squares	bar flats on application
1/4" through 2"	1/4" through 4 1/2"	1/2" through 2"	

Hot Rolled
Cold Finished
Quality Stainless Steel Bars

STAINLESS BILLETS FOR FORGING IN COMPLETE SIZE RANGES

Rotary Electric Steel Co.

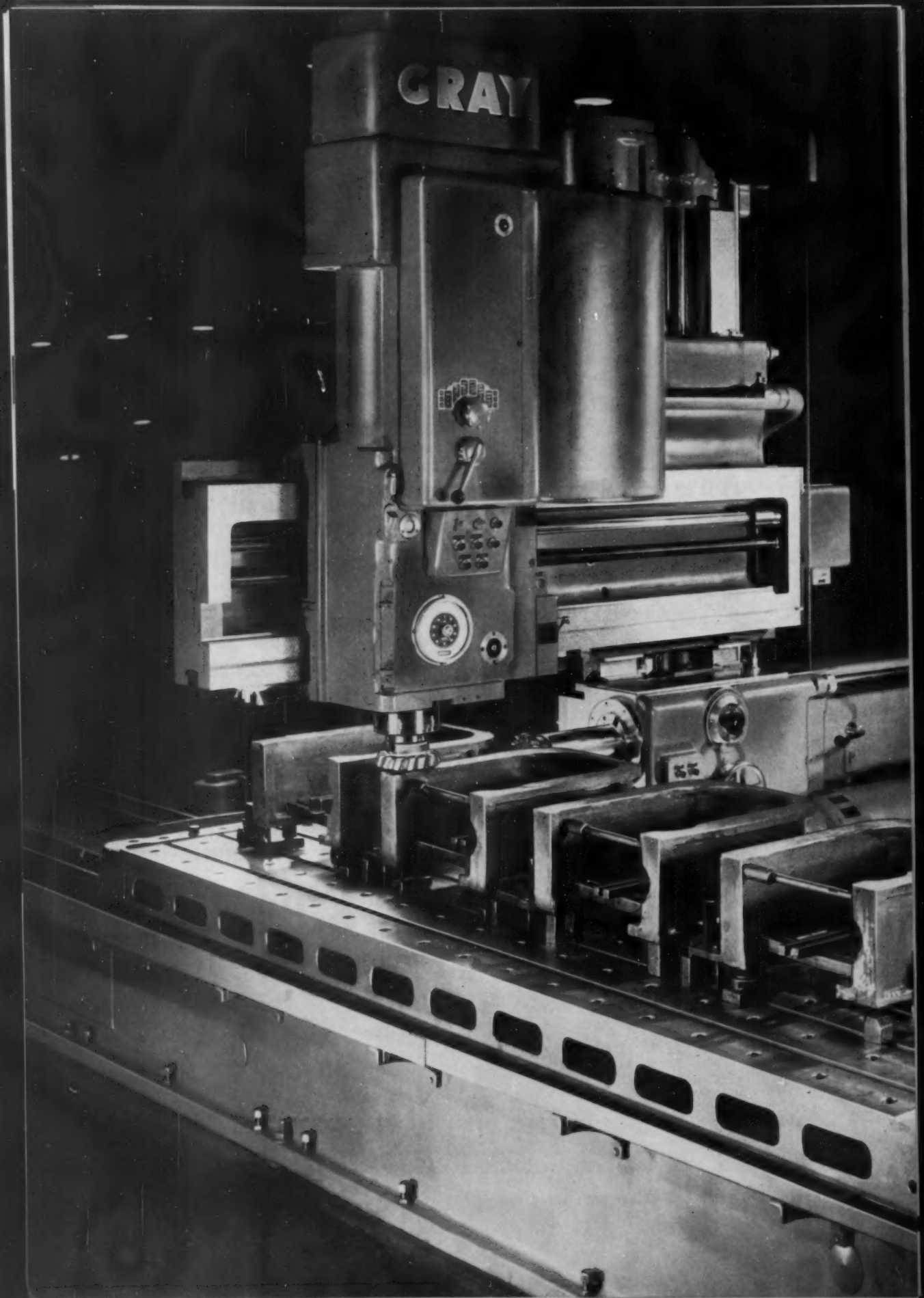
P. O. BOX 4606 • DETROIT 34, MICHIGAN



ALLOY and STAINLESS STEELS
BILLETS • SLABS
HOT ROLLED and
COLD FINISHED BARS

SALES OFFICES—Chicago • Cleveland • Newark, N. J. • Hartford, Conn.

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GRAY

If you're tired of seeing small jobs on your large expensive millers . . .

If you're tired of extra set-ups because your miller has only a single head . . .

If you're tired of whittling away at rugged jobs with low power heads . . .

If you're tired of complicated controls that make your operator a mountain goat . . .

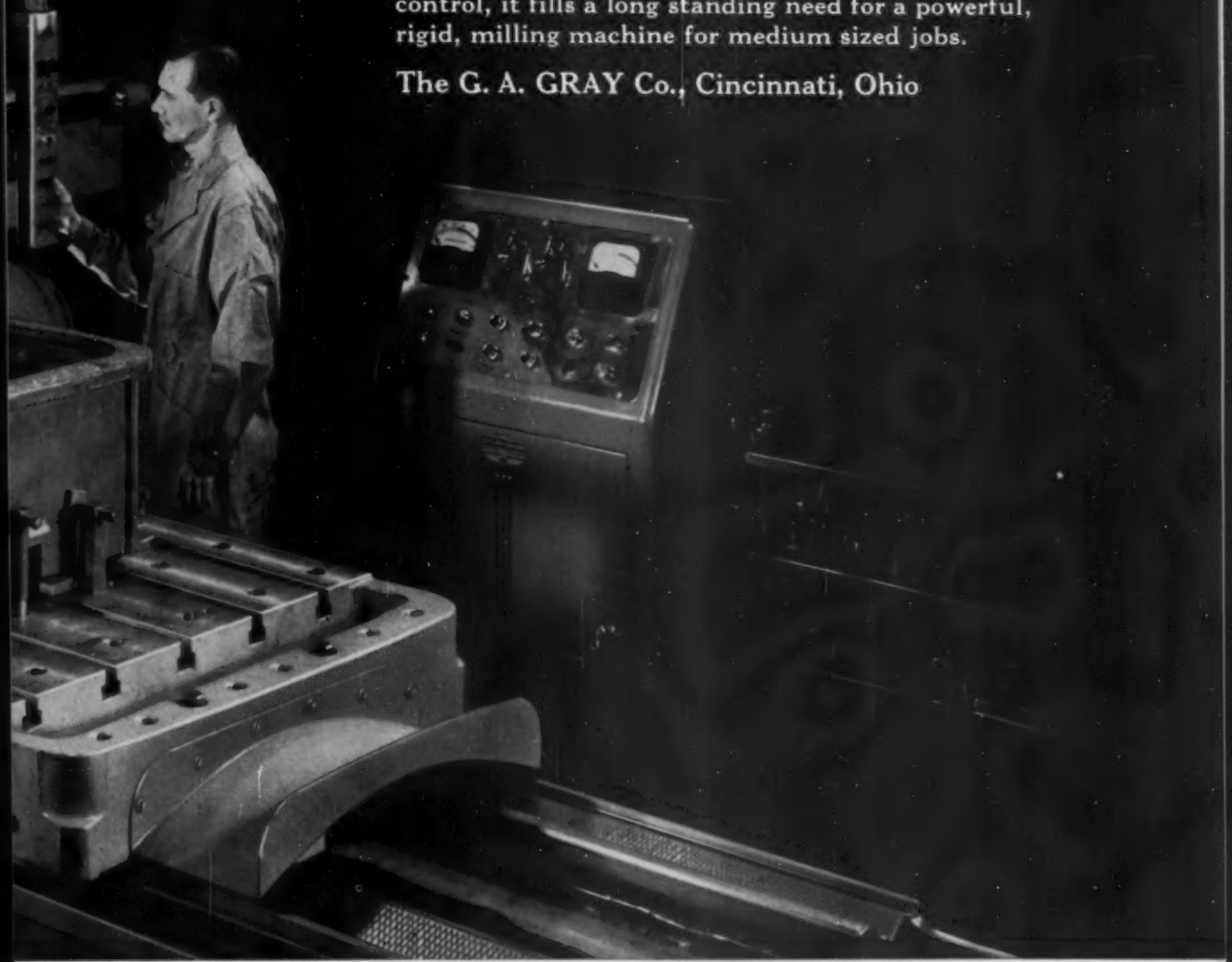
this new

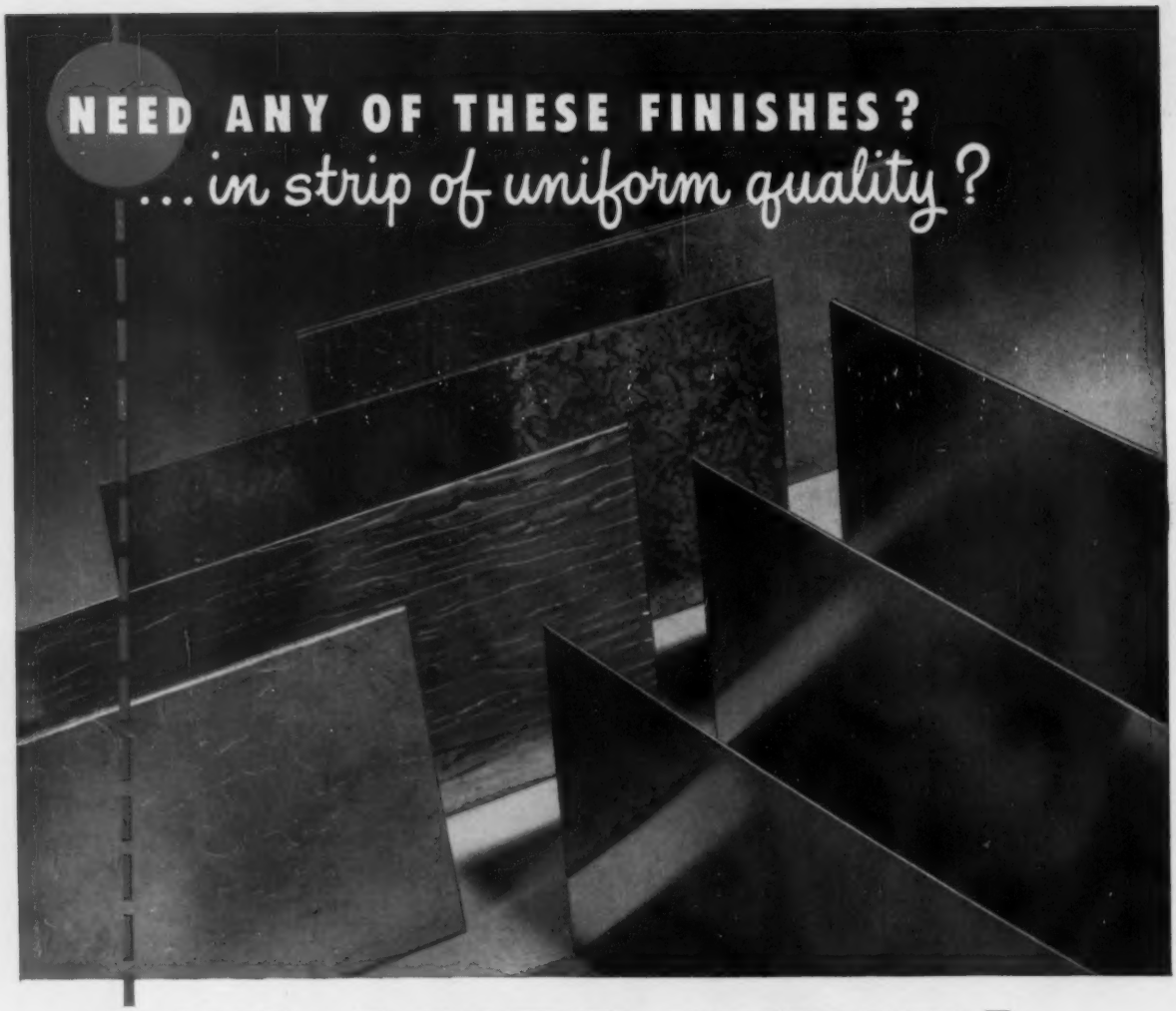
GRAY HANDYMILL

is for you

Built in a wide range of high horsepower sizes, with great variety in head combinations, simplified pendant control, it fills a long standing need for a powerful, rigid, milling machine for medium sized jobs.

The G. A. GRAY Co., Cincinnati, Ohio





GET AMERSTRIP!

Why buy Amerstrip? Simply this: it brings you a finish tailored to your needs. High quality Amerstrip will minimize reject problems and improve the finished product. These are the best reasons, but not the only ones, for choosing Amerstrip cold rolled strip steel.

The metallurgical care that goes into making the Amerstrip, the even temper that goes with every shipment, also help you cut rejects and costs, help you make steadily improved products of steel.

Amerstrip comes in the widest available range of analyses, sizes, and finishes. You can get it embossed, coated, or in any of the standard finishes.

Specify Amerstrip.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL CORPORATION
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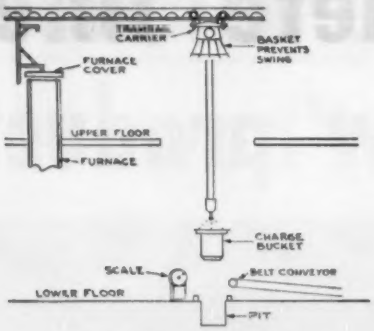
Amerstrip

USS

UNITED STATES STEEL

Melting Furnace Charged Automatically

One Man Takes Care of Entire Furnace-Charging Job



CYCLE OF OPERATION:

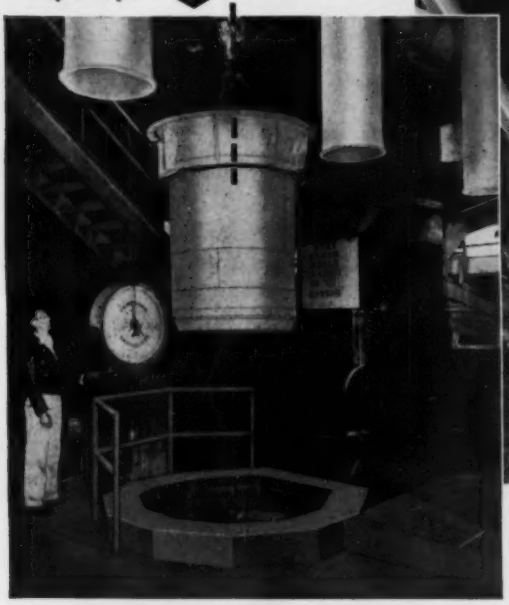
1. Bucket in pit filled by belt conveyor.
2. Operator presses start button.
3. Hoist lifts charge bucket to carrier.
4. Carrier moves only when bucket is in high position.
5. As carrier approaches furnace it swings cover away.
6. Bucket lowers into furnace and empties.
7. By reverse series of operation bucket returns to pit.

From Time Bucket Leaves Pit until it Returns, All Operations are Automatic



Tramrail carrier over furnace with bucket starting descent.

Bucket on way up from pit.



BUCKETS loaded with 2000 lbs. of charge materials consisting mostly of old battery plates are delivered from weighing scale to melting furnace, emptied and returned automatically by means of a Cleveland Tramrail Automatic Dispatch System. The entire furnace-charging job is taken care of by a single man.

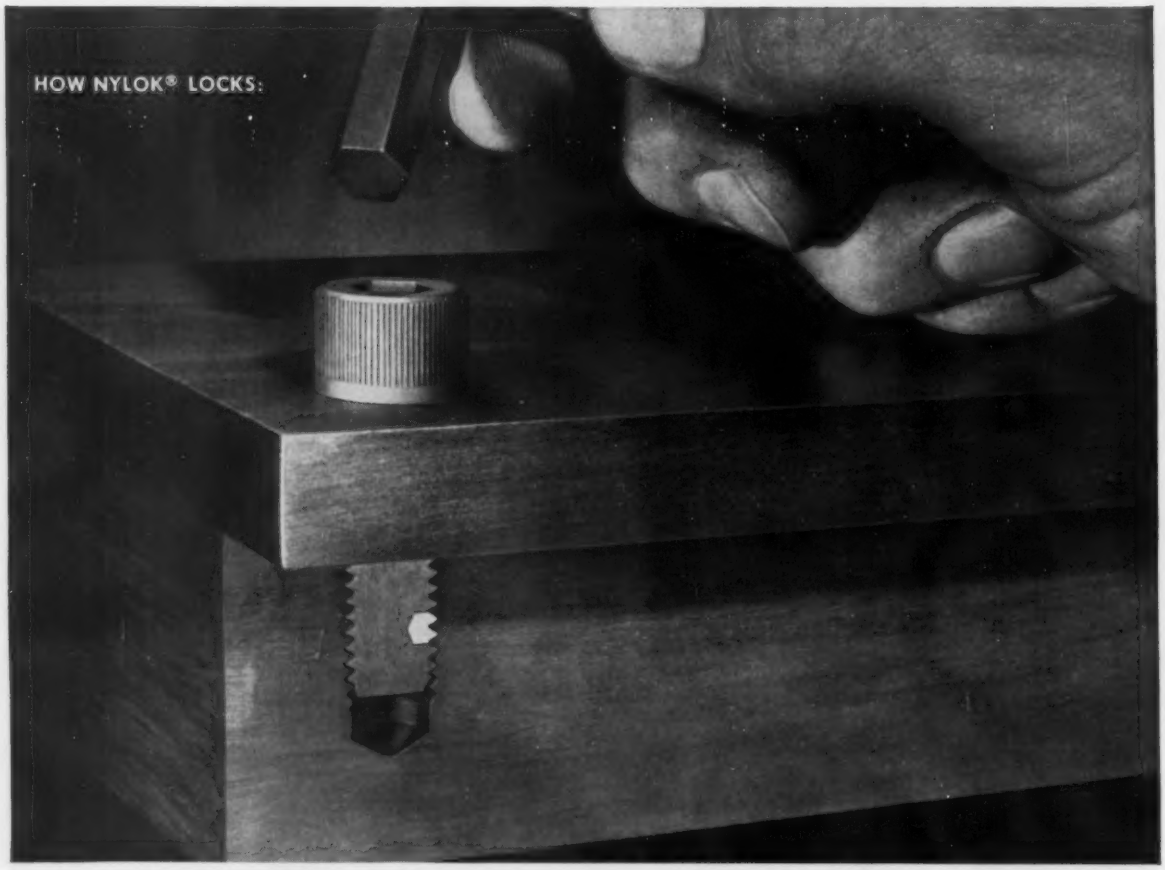
This simple, easy method of furnace-charging is one example of the variety of ways Cleveland Tramrail Automatic Dispatch Systems are aiding many companies in different fields to raise plant efficiency, cut costs and improve safety.

CLEVELAND TRAMRAIL

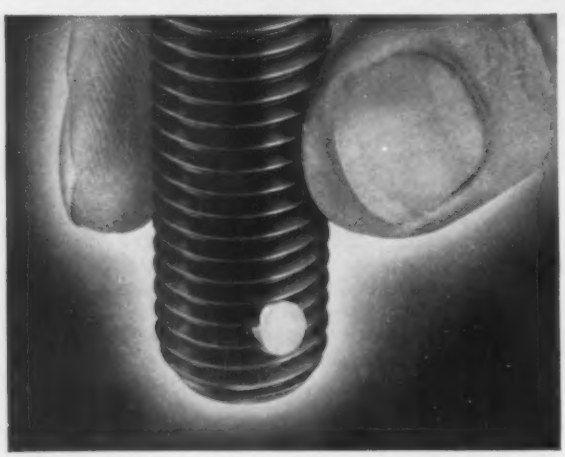
Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO., 4914 East 290th St., WICKLIFFE, OHIO

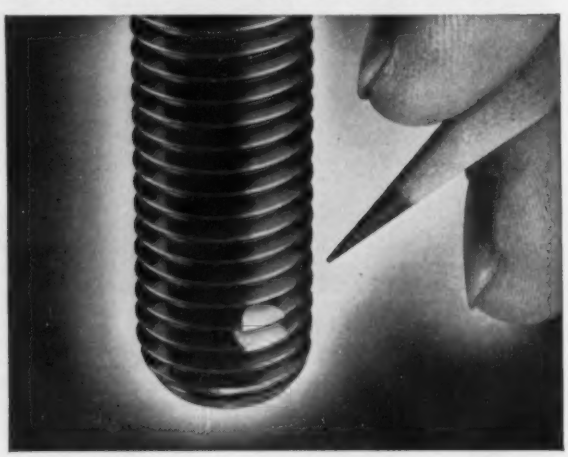
NEW—a complete line of socket screw products



LOCKED! The tough, resilient nylon pellet keys itself into the mating threads. It forces threads together, and locks the screw securely.



BEFORE ASSEMBLY. The nylon pellet projects slightly beyond male threads. When assembled, female threads will be impressed into it. Pellet locks effectively whether the screw is seated or not.



AFTER REMOVAL. "Plastic memory" of pellet has expanded impressed threads to greater diameter than screw threads. Screw can be used repeatedly. In use, "memory" keeps threads tightly locked.

self-locking UNBRAKO that won't work loose

They simplify design and save production time

UNBRAKO socket screws are now available embodying the Nylok* self-locking principle. Nylok provides a truly practical new solution to the problem of making screws self-locking.

An UNBRAKO screw with Nylok is a single self-locking unit. No auxiliary locking devices are needed. Just thread the UNBRAKO into any tapped hole. *Seated or not*, it locks positively wherever wrenching stops. The tough, resilient nylon pellet forces mating threads together and holds tight. The screw will not shake loose.

You save production time when you build products with self-locking UNBRAKOS. And you get greater simplicity in design with less bulk and weight. The number of parts you must assemble to achieve full locking action is reduced to the absolute minimum. Lockwashers under screw heads are no longer necessary. Costly wiring of cross drilled heads is eliminated. So are cotter pins and complex multiple set screw installations.

Self-locking UNBRAKOS are completely reusable. They have uniform locking and installation torques—with no galling or seizing on mating threads. They successfully withstand temperatures from —70° to 250°F. And, on properly seated screws, the pellet acts as a liquid seal.

Self-locking UNBRAKO socket screws come in a complete range of standard sizes and materials. See your authorized industrial distributor. Technical data and specifications are detailed in Bulletin 2193. Write us for your copy today. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 17, Pa.

**T.M. Reg. U.S. Pat. Off., The Nylok Corporation*

UNBRAKO SOCKET SCREW DIVISION

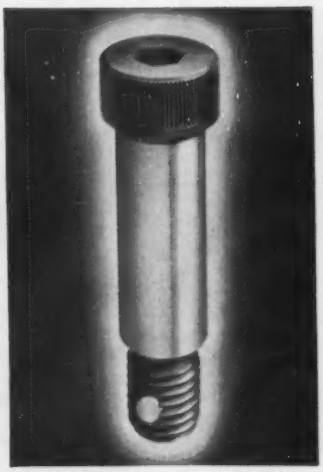
STANDARD PRESSED STEEL CO.

SPS

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Socket head cap screws. Standard sizes # 6 to 1 in.



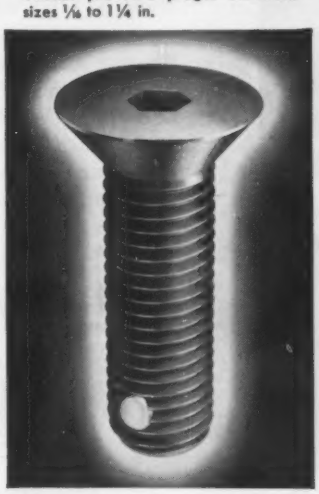
Socket shoulder screws. Standard sizes ¼ to ¾ in.



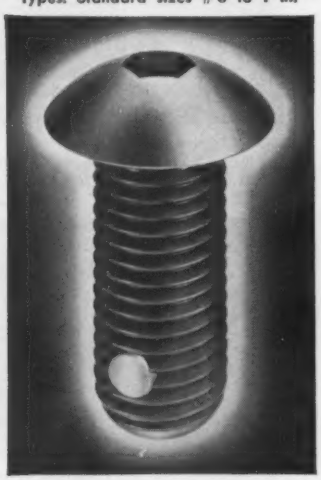
Socket pressure plugs. Standard sizes ⅛ to 1¼ in.



Socket set screws. All standard point types. Standard sizes # 6 to 1 in.



Flat head socket screws. Standard sizes # 6 to ¾ in.

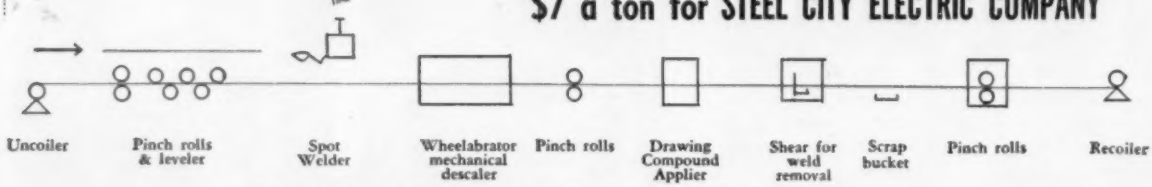


Button head socket screws. Standard sizes # 6 to ⅝ in.



How much would you SAVE in one year by *cutting steel costs* $7 a ton?

Wheelabrator® Mechanical Descaling saves $7 a ton for STEEL CITY ELECTRIC COMPANY



Schematic Diagram: Strip Cleaning Line, Steel City Electric Company



Only one man is required to operate the mechanical descaling line at Steel City Electric Co.



Strip is Wheelabrated prior to stamping and electrogalvanizing of electrical products.

Cleaning hot rolled 1010 steel strip in a Wheelabrator mechanical descaler for $3 a ton has brought big savings for Steel City Electric Company of Pittsburgh, which was paying a premium of $10 a ton for pickled steel from the mill. The $3 figure includes the operating cost for all equipment in the cleaning line. Cleaning strip up to 48" wide and from .060" to .1875" thick, the Wheelabrator descaler cleans an average of 50 tons of steel in an 8-hour day — a potential saving of $350 in steel costs every 8 hours. Don't let saving like this pass you by — investigate Wheelabrator mechanical descaling today. Find out how it can be tailored to your specific needs.

For more information on Wheelabrator savings for steel processors, write today for Bulletin 128D.



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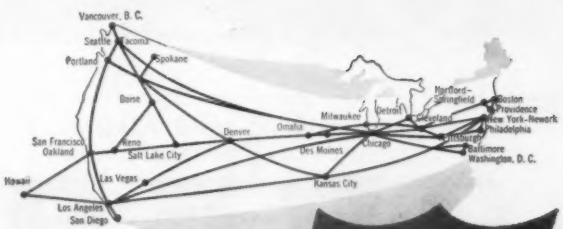
REPLACEMENT PARTS leaving Cleveland after midnight tonight on United's 300-mph DC-6A "Big Lift" Cargoliners will be in Los Angeles first thing tomorrow morning. Cost for 100-lb. shipment—$20.50*.

YOU CAN DEPEND ON UNITED—United's Reserved Air Freight guarantees the space you need on the flight you want. . . . Frequent Mainliner and Cargoliner departures, plus the most modern cargo handling facilities, get your shipment off the ground *fast*. . . . And United's weather-mapping radar helps assure *on-time* arrival.

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*These are the rates for most commodities. They are often lower for larger shipments. Rates shown are for information only, are subject to change, and do not include the 3% federal tax on domestic shipments.





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Republic

The HOK-1 is a four-place, twin intermeshing rotor machine powered by a Pratt & Whitney R-1340 nine-cylinder, air-cooled engine.



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Titanium saves weight... cuts cost in the Navy's HOK-1

The HOK-1 is a general utility, high performance helicopter manufactured by Kaman Aircraft Corporation, Bloomfield, Connecticut.

A weight-cost formula developed by Kaman engineers and used in combination with Titanium has resulted in substantial savings in the production of the HOK-1.

In the photo at left, a Kaman assembler is shown fastening sections of the firewall between pilot and engine compartments. These sections are fabricated from .016 gage Republic Titanium, Type RS-70 Annealed. This type has good forming qualities and a minimum tensile strength of 80,000 psi.

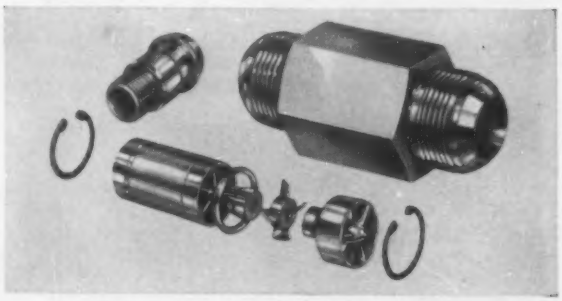
The high strength and lightweight advantages of Republic Titanium are adding range, speed and maneuverability to both military and commercial aircraft. These characteristics—plus Titanium's extremely high resistance to most forms of corrosion—are also being used to advantage in non-military applications such as, chemical equipment, heat exchangers, dehydration trays, anodizing racks and food-processing equipment.

Republic, world's largest producer of alloy and stainless steels, and pioneer in high strength-to-weight metals, offers you years of experience gained through helping hundreds of manufacturers design and redesign their products to get more strength with less weight at less cost.

This experience is available to you for your design and development work without cost or obligation. Just send the coupon or call your local Republic Sales Office.

ALLOY STEELS are vital in meeting today's demands for speed and light weight. They provide the highest strength values—plus an exceptionally high strength-to-weight ratio that permits transmission of thousands of horsepower through tough, strong gears and shafts free from excess weight. Republic will help you apply these fine steels to insure safety, extend equipment life and reduce maintenance and replacement costs.

OTHER REPUBLIC PRODUCTS FOR THE AIRCRAFT INDUSTRY



ENDURO STAINLESS STEEL, because of its resistance to corrosion, is used for bearings, housing and rotor in this turbine flow meter made by Fischer & Porter Co., Hatboro, Pa. This delicate instrument measures precise flow rate in testing jet fuels. The slightest trace of corrosion would impair its accuracy. ENDURO Stainless Steel helps maintain an accuracy of ±½%. Republic produces ENDURO in all commercial forms.



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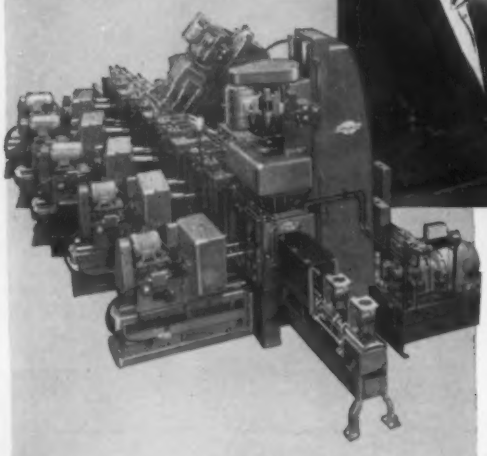
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1810 Mason Ave.
Rockford, Illinois

Projection Welding

How to Use It to Help Put the Profits Back into Manufacturing

What is Projection Welding?

Projection welding is a resistance welding process for joining flat or shaped pieces of metal. The two work pieces generally are clamped under electrodes of considerable area that are either flat or made to fit the work. Formed projections or embossments are processed on one of the pieces before welding. Pressure is applied and the current divides equally among the projections and produces welds of approximate equal strength. The heating and pressure process continues until the projections or embossments are flattened sufficiently to bring the work pieces against each other.

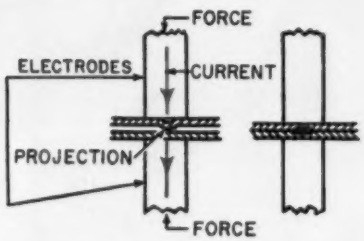


Fig. 1 Projection welding process.

Advantages of Projection Welding

A projection resistance weld requires no additional metal, arcs, gas or flame. *The weld is within the materials themselves*—and is as strong, if not stronger than the parent metals. It offers a 100% strength factor compared to 80% for arc or flame welds.

The simplicity of a resistance welding operation often reduces multi-step fastening operations and enables unskilled operators to produce consistent, high quality welds at peak production.

Many products that were not originally designed for resistance welding can easily be adapted with simple tooling. Costly jigs and fixtures can be eliminated too, because Sciaky resistance welding techniques practically eliminate warpage and distortion of work pieces.

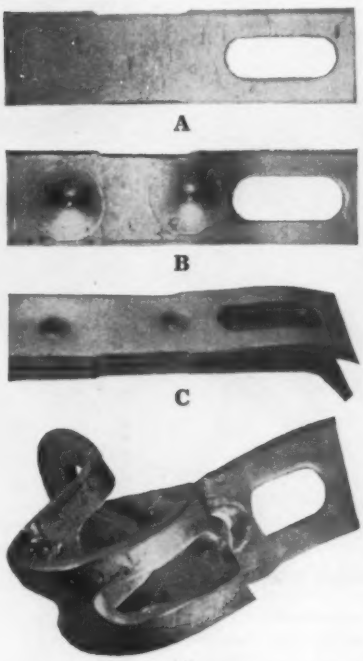


Fig. 2 A. & B. Phosphor bronze clips. Each is .020" thick and has been first silver, then gold plated. C. The welded part. D. The destruction test. Note the high strength bond and complete nugget separation from parent metal.

When to Use Projection Welding

As a rule, this application is done in multiple projections simultaneously and also, this technique is very useful where several welds are to be made in a small area. It is often used to attach brackets or fasteners, or to join metal parts having machined projections. Metals of light thickness may be welded to heavy thicknesses. However, various metals do present problems, but with properly applied Sciaky techniques, metals such as aluminum and bronze are readily and effectively projection welded. Note Fig. 2—A, B, C and D.

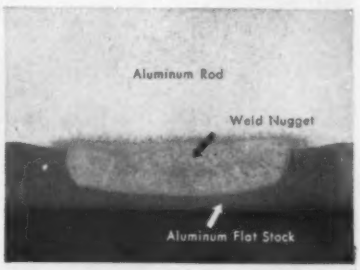


Fig. 3 Macrograph of all aluminum projection weld joining a rod to .062" flat stock.

Sciaky Research Center

Sciaky's new Research Center invites *you* to submit your metal fastening problems. This entire facility, with the latest resistance welding machines, testing instruments, and trained personnel is devoted to solving your joining problems and advancing the application and development of resistance welding.

Write Today for Free Sciaky Literature

Start to build your data file on resistance welding today. Our "Resistance Welding at Work" publication, Vol. 3, No. 2 and Vol. 4, No. 1, contains case histories of Sciaky projection welding techniques. Designers' Guide Bulletin 331 discusses projection welding and other forms of resistance welding.

Describe your particular fastening problem on company letterhead and we will send suitable back and future issues of our "RWAW" publication. All contain impressive examples of Sciaky's basic thinking—resistance welding techniques designed to put the profits back into manufacturing.

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Typical parts made of Alcoa Aluminum Screw Machine Stock by Enterprise Mfg. Co.

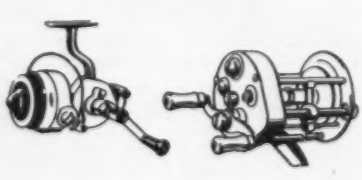
HOW PFLUEGER* MAKES MORE AND BETTER REELS WITH ALCOA® ALUMINUM SCREW MACHINE STOCK

Since Civil War days, 3 generations of Pfluegers have parlayed a small harness business into the giant Enterprise Manufacturing Company of Akron, Ohio . . . one of the world's foremost makers of fishing tackle. Alcoa Aluminum Screw Machine Stock has contributed to the sales appeal of Pflueger reels since 1929.

The Pflueger success story is typical of the competitive advantages frequently gained by a switch to aluminum screw machine stock. Its free-machining qualities speed production by permitting operations at maximum spindle speeds . . . with less tool breakage, fewer rejects, better finish with fewer secondary operations. It has longer tool life, provides three times as many parts per pound of metal. And abundant supplies are available.

All these solid economic advantages point up the wisdom of a hard commercial look at aluminum screw machine stock. Alcoa will provide you with technical assistance, alloys information, and the greatest store of experienced counsel available in the industry. Just call your nearby Alcoa sales office, listed under "Aluminum" in your phone book. Aluminum Company of America, 870-K Alcoa Building, Pittsburgh 19, Pennsylvania.

PFLUEGER





IN PURCHASING

Wayne Miller, Director of Purchasing, says,

"Pflueger reels have used aluminum parts since 1929 . . . and we've always bought our metal from Alcoa. Alcoa's personnel have always been most cooperative. Their shipping dates and promises always hit together. We especially like the shipping notices Alcoa forwards to us. Tolerances and composition always meet our most exacting specifications. Engineering help and warehouse service continue to keep us happy."



IN DESIGN

Mr. Tom Sarah, Chief Engineer of Design and Development, says,

"Our annual sales conference guides design policy. Customers began to insist on lightness; we were given the job of lightening up while still maintaining quality and dependability. Aluminum looked like a natural . . . and was. It takes the high-quality finish we require. It offers the corrosion resistance so essential when our reels are used in salt-water fishing. And Alcoa's research and development facilities were a great help to us in selecting proper alloys and finishes. We will be using more and more aluminum parts."



IN PRODUCTION

Garnett Young, Foreman, in discussing production with operator John Schmidt (left), says,

"Many of our workers are women and aluminum's light weight eases our materials handling. We get longer tool life and can hold closer tolerances on operations such as drilling, milling, tapping and machining. We cut fine-pitch threads and we prefer aluminum for this more than any other metal. Because aluminum is easier on tools, we get less heat and can use lighter oils. With aluminum, we have no trouble with concentricity. We run at top spindle speeds. There's less chip trouble and we get high prices for our scrap. If trouble develops, Alcoa sends engineering help to straighten us out in a hurry."



IN OUTSIDE SUPPLY

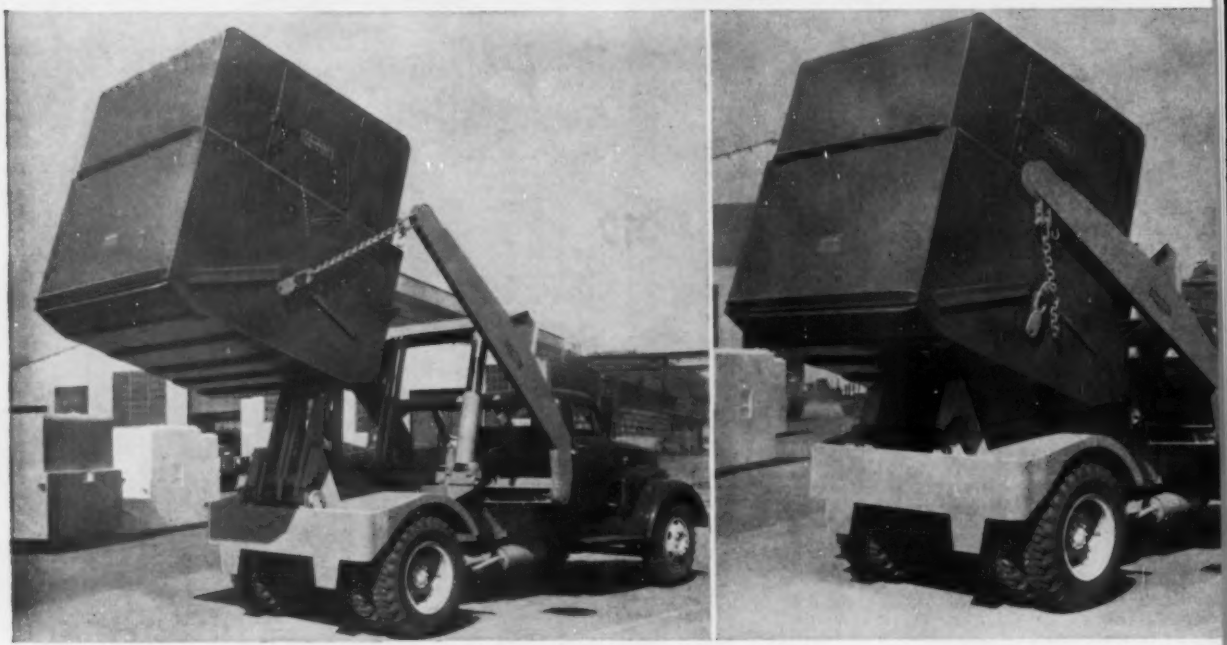
Some parts of the famous Pflueger reels are made by Locke Machine Company of Cleveland, Ohio. (Member of the National Screw Machine Products Association.) Here Mr. A. W. Glasheen, Estimator; Mr. J. E. Tomer, Vice President and Mr. E. H. Baker, Factory Manager, discuss the finish requirements of a Pflueger reel. They say, "Pflueger demands tight tolerances and a superfine surface finish. We find it easy to comply by using Alcoa Aluminum Screw Machine Stock. Tool life is good and we use extremely heavy machine feeds. Concentricity requirements are close, but we maintain them with aluminum. Our operators like to work with aluminum and we like to deal with Alcoa. Service has been extremely prompt, and their quality is excellent. We feel it is the best on the market. We have never had to reject Alcoa Screw Machine Stock.

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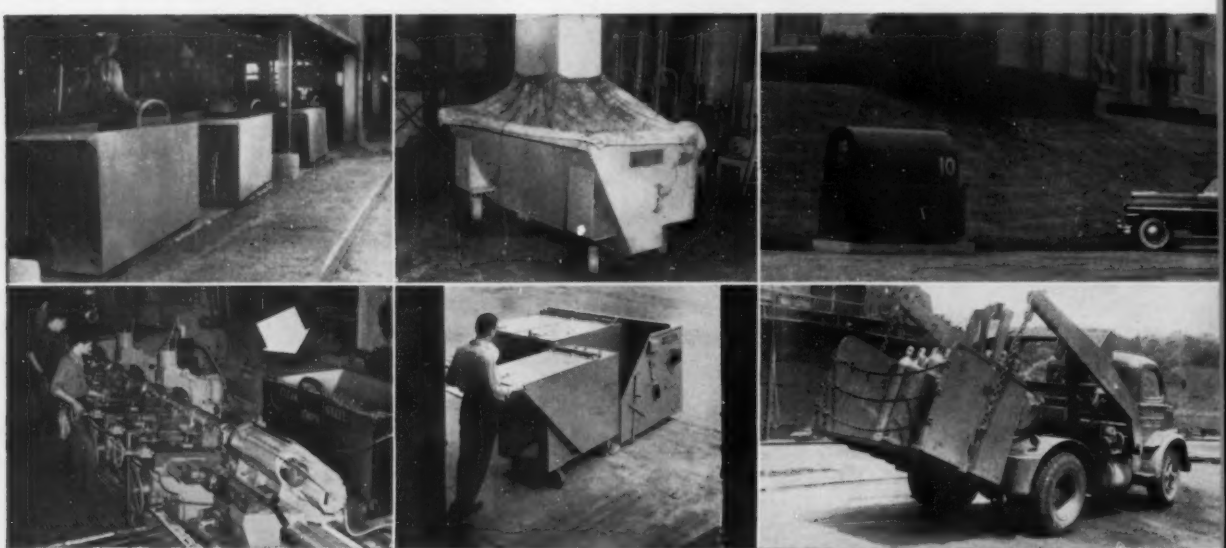
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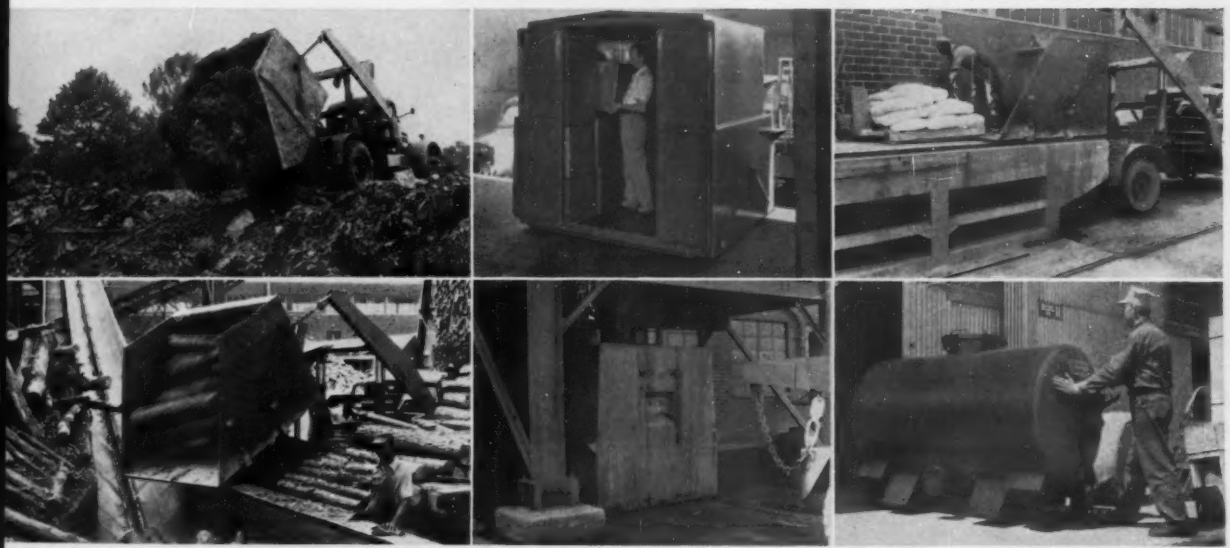
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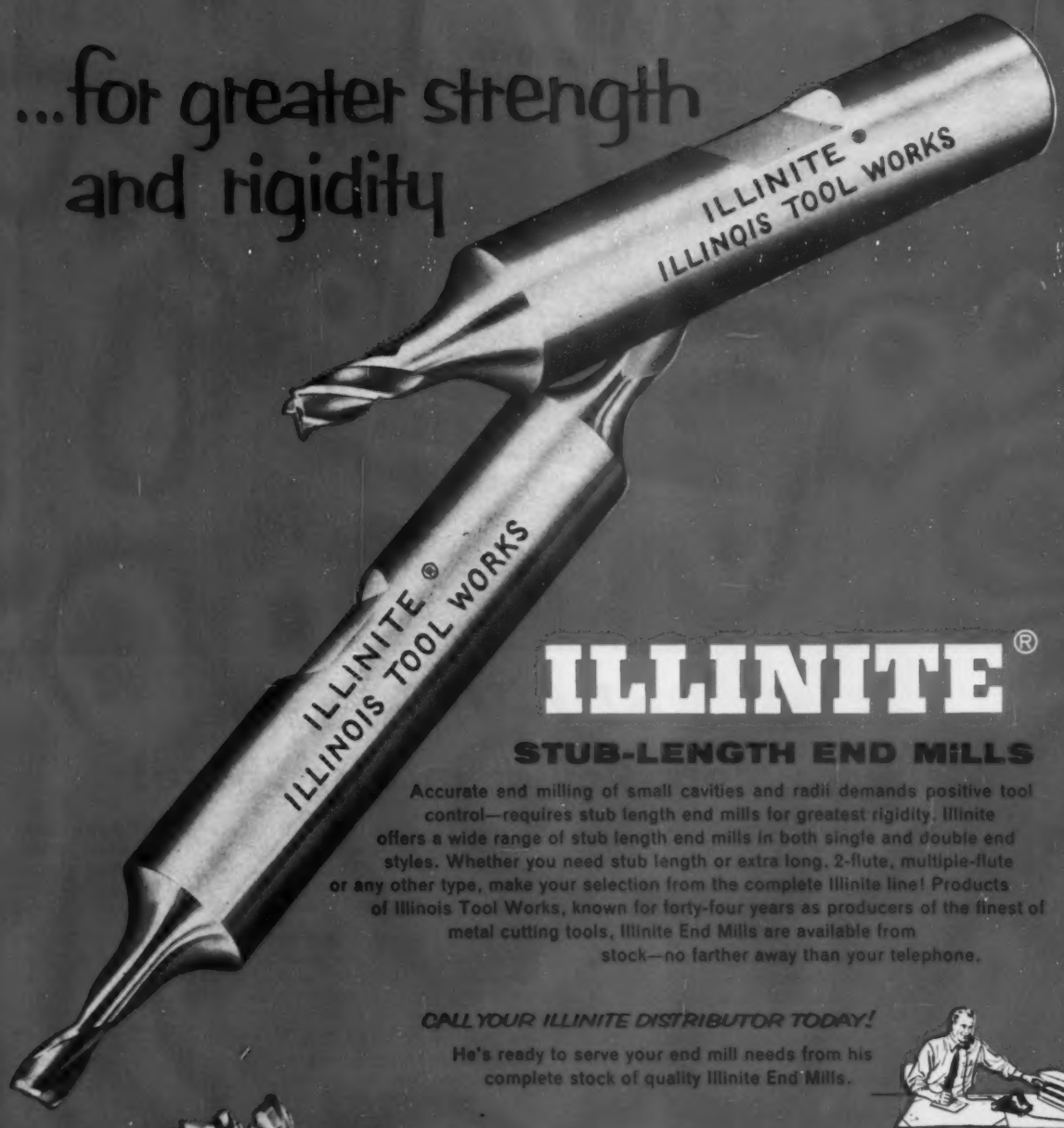
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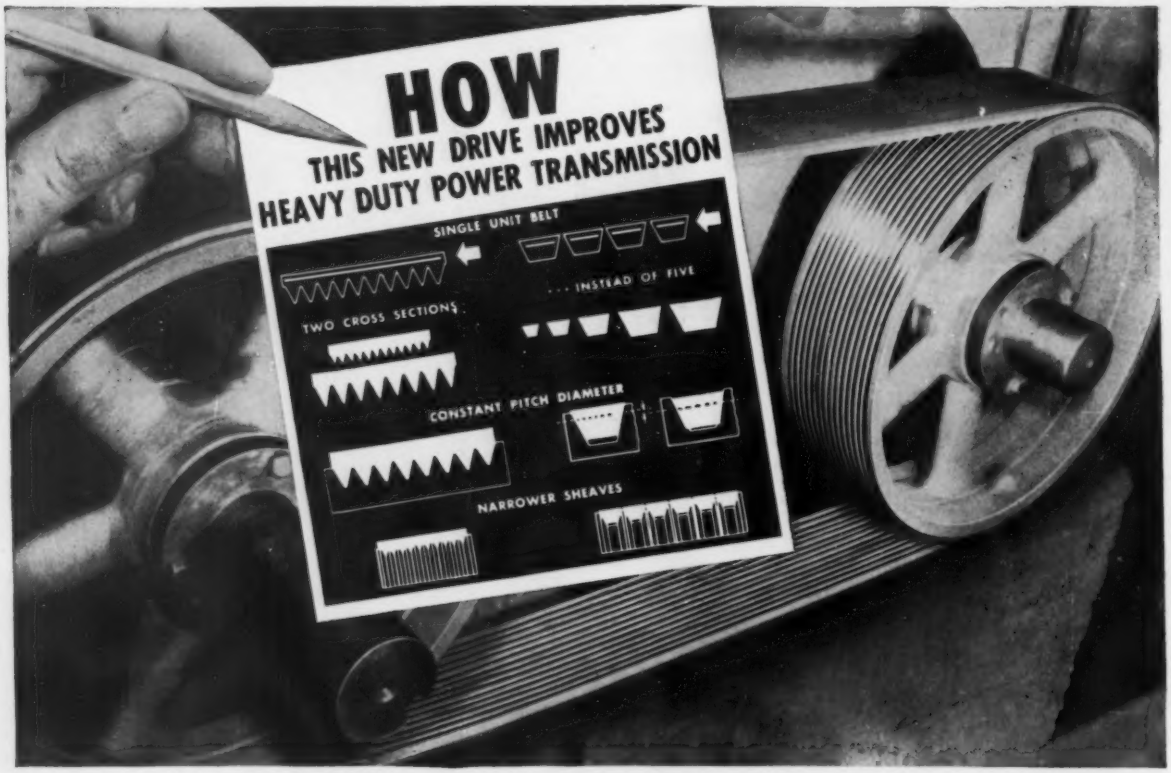
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Delivers More Power in Less Space!

No other belt drive can deliver as much power in the same space. It's R/M's patented Poly-V Drive developed by R/M engineers after years of research. This totally new concept in power transmission delivers up to 50% more power than a conventional V-belt drive of equal width.

Unique design accounts for the unusual power capacity of R/M Poly-V Drive. A *single, endless* belt with parallel V-ribs runs on sheaves specially designed to mate precisely with the belt ribs. The uniform pull of this single unit belt distributes drive load evenly over the full width of the sheave . . . gives higher horsepower capacity per inch of drive width than ever before possible.

There are many advantages in this space-saving drive wherever heavy duty power transmission is required . . . in the equipment you manufacture—or the equipment you use in your plant. Poly-V Drive has eliminated the matching problems of multiple V-belt drives, greatly increased the life expectancy of belts and sheaves and maintains more constant speed ratios under all loads. Just *two* cross sections of Poly-V meet every heavy duty power requirement—R/M Poly-V Drive cuts costly belt and sheave inventories to a new low!

Let the R/M engineers who developed Poly-V Drive work with your engineers to improve your power transmission applications. Contact R/M . . . or write for a copy of Poly-V* Drive Bulletin #6638.

CONDOR V-BELTS • R/M SUPER-POWER V-BELTS

Write for Bulletin #6868 on the complete line of Condor V-Belts for regular service on conventional V-belt drives. Also write for Bulletin #6628 on R/M Super-Power V-Belts with 40% more Horsepower capacity where needed.



**Poly-V is a registered Raybestos-Manhattan trademark*

RM 648

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

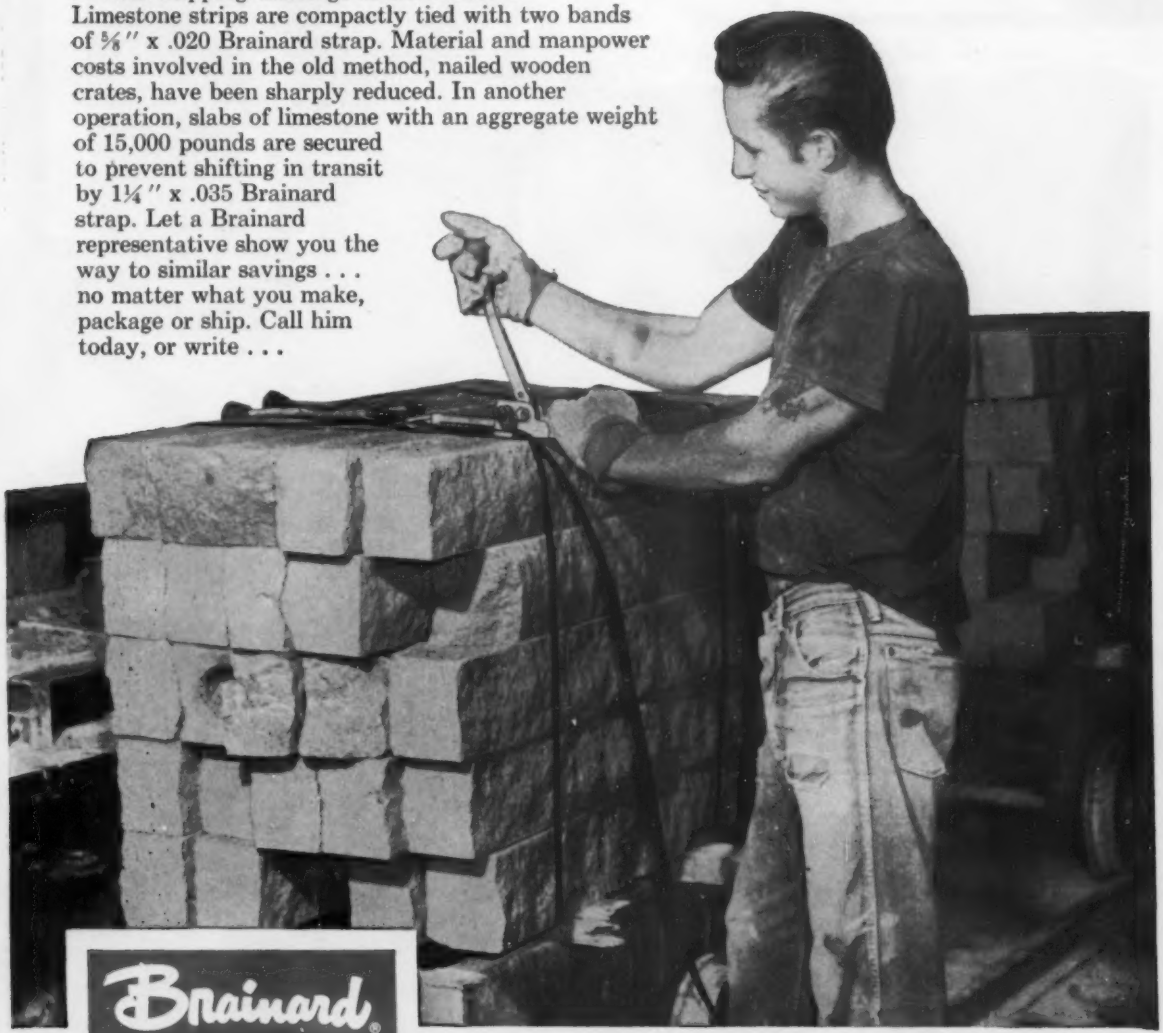
How

BRAINARD STRAPPING SERVICE

slashed building stone handling costs 50%



With the help of Lew Dickson, a Brainard strapping expert, Empire Stone Co., Bloomington, Indiana, reduced limestone handling costs by more than 50% . . . cut shipping breakage to a minimum. Limestone strips are compactly tied with two bands of ⅝" x .020 Brainard strap. Material and manpower costs involved in the old method, nailed wooden crates, have been sharply reduced. In another operation, slabs of limestone with an aggregate weight of 15,000 pounds are secured to prevent shifting in transit by 1¼" x .035 Brainard strap. Let a Brainard representative show you the way to similar savings . . . no matter what you make, package or ship. Call him today, or write . . .



Brainard

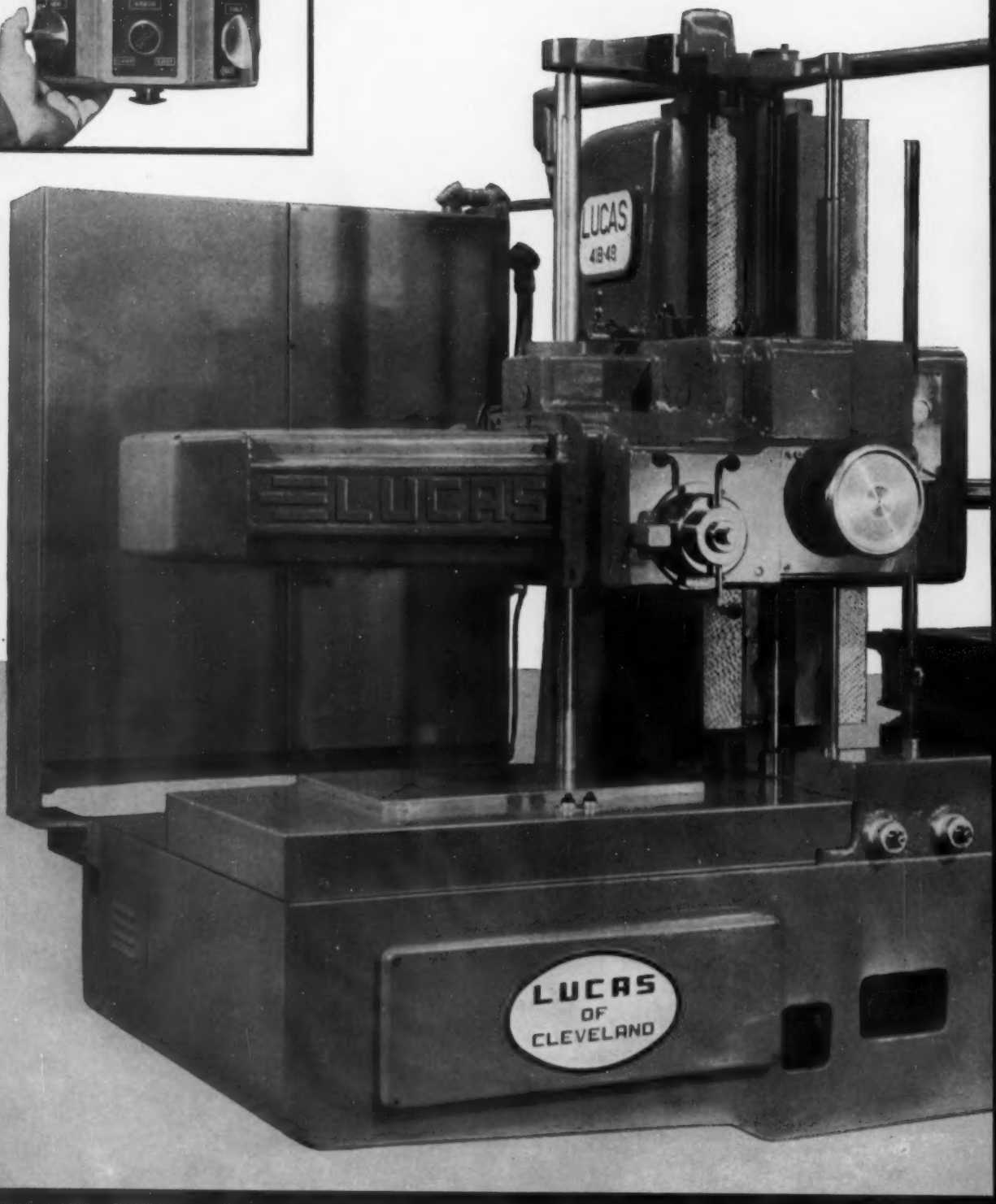
SHARONSTEEL

STEEL DIVISION
SHARON STEEL CORPORATION

THE BRAINARD STEEL DIVISION
of the Sharon Steel Corporation
Dept. I-10, Griswold Street, Warren, Ohio
MAKERS OF QUALITY STEEL STRAPPING

revolutionary full-control



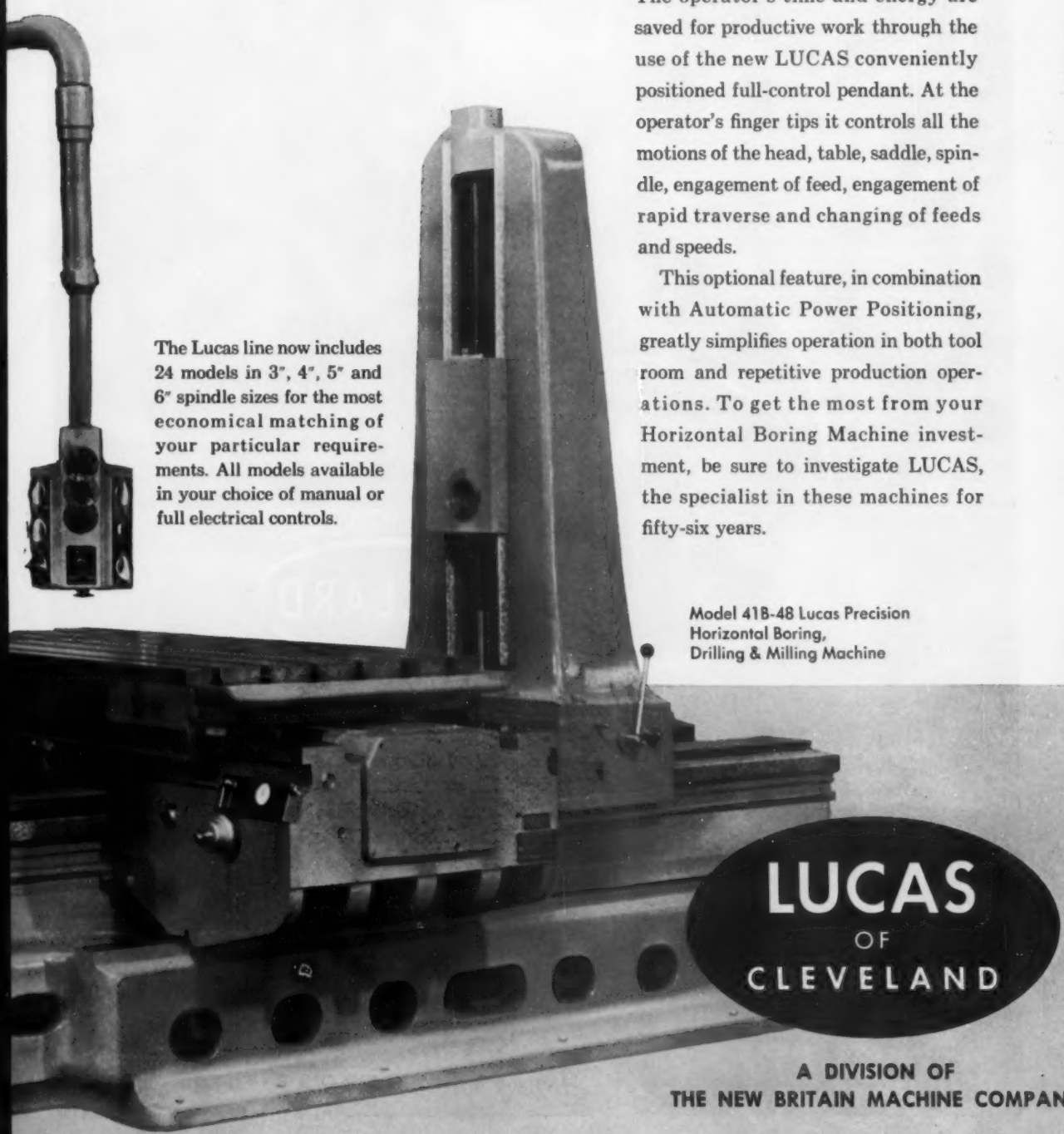


pendant handles all motions of the Lucas — faster

The operator's time and energy are saved for productive work through the use of the new LUCAS conveniently positioned full-control pendant. At the operator's finger tips it controls all the motions of the head, table, saddle, spindle, engagement of feed, engagement of rapid traverse and changing of feeds and speeds.

This optional feature, in combination with Automatic Power Positioning, greatly simplifies operation in both tool room and repetitive production operations. To get the most from your Horizontal Boring Machine investment, be sure to investigate LUCAS, the specialist in these machines for fifty-six years.

The Lucas line now includes 24 models in 3", 4", 5" and 6" spindle sizes for the most economical matching of your particular requirements. All models available in your choice of manual or full electrical controls.



Model 41B-48 Lucas Precision Horizontal Boring, Drilling & Milling Machine

LUCAS OF CLEVELAND

A DIVISION OF THE NEW BRITAIN MACHINE COMPANY

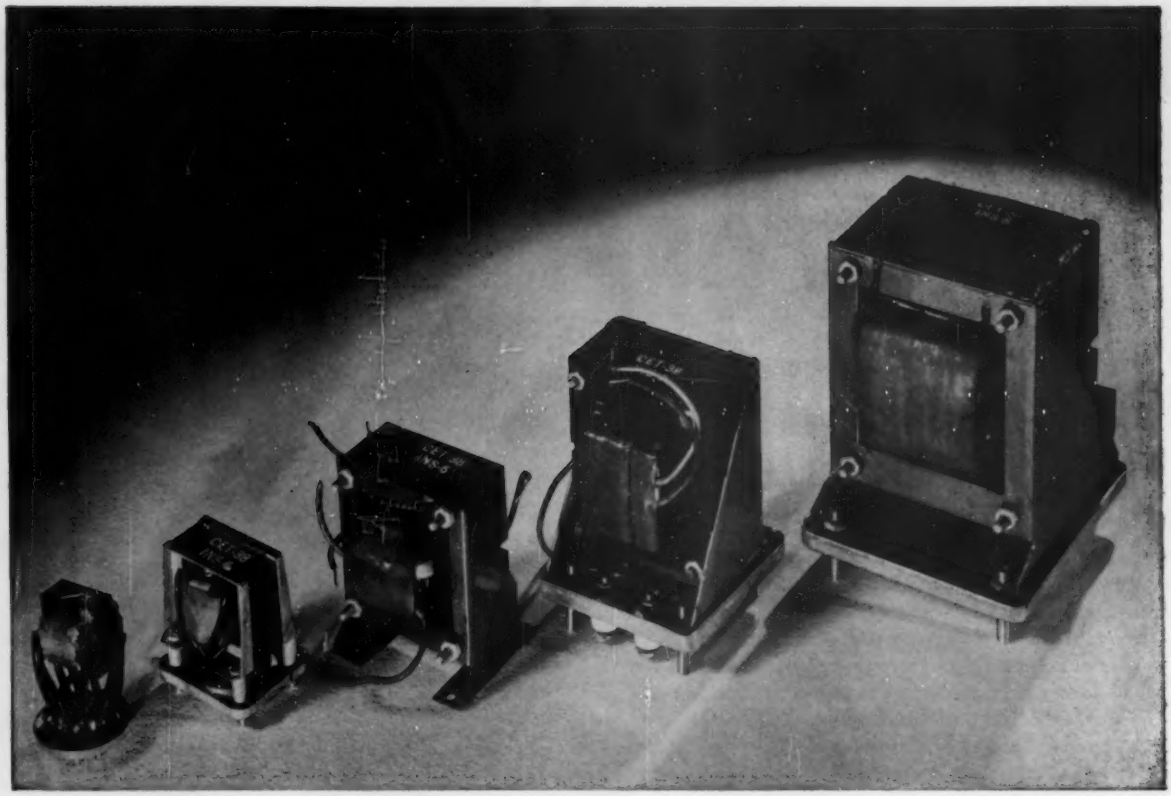


BULLARD

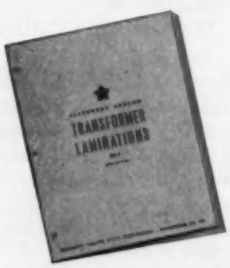
"Like many other firms," says Mr. A. Balas, Equipment Engineer at Mergenthaler Linotype Co., N.Y.C., "we are constantly on the alert for new equipment, new processes and new ideas. This constant search for improvement convinced us of the need to purchase a versatile, time-saving, cost-saving and, above all, accurate Horizontal Boring Machine. We checked them all — feature for feature — and then bought the Bullard H.B.M., Model 75. We feel it has enough "built in reserves" to take care of any contingency or new development which may come up. It's reassuring to know that an investment of this size won't go out of style next month."

Why don't you get the full story on the many features and advantages offered you with a Bullard H.B.M., Model 75 in your plant. For a complete line catalog, just call your nearest Bullard Sales Office, Distributor or write

THE BULLARD COMPANY BRIDGEPORT 9, CONN.



A Transformer becomes a precision device with Allegheny Magnetic Materials in the core



Write for your Copy

"TRANSFORMER LAMINATIONS"

84 pages of valuable technical data on standard and custom-made laminations from all grades of Allegheny Ludlum magnetic core materials. Prepared from carefully checked and certified laboratory and service tests—includes standard dimensions, specifications, weights, etc. Sent free on request . . . ask for your copy.

ADDRESS DEPT. A-82

★ **ALLEGHENY SILICON STEEL**

★ **ALLEGHENY 4750**

★ **ALLEGHENY MUMETAL**

The operation of a transformer is no better than the magnetic core around which it is built. With Allegheny magnetic materials in the core, you get the *best*—uniformly and consistently.

Sure there are reasons why! For one thing, there's the long experience of a pioneer in development and quality control of electrical alloys. But most important, the A-L line offers complete coverage of any requirement you may have, any service specification. It includes all grades of silicon steel sheets or coil strip, as well as Allegheny Silectron (grain-oriented silicon steel), and a wide selection of special high-permeability alloys such as Allegheny 4750, Mumetal, etc.

In addition, our service on magnetic materials includes complete lamination fabrication and heat treatment facilities. What's more, this extensive experience in our own lamination stamping department is a bonus value for all users of A-L electrical sheets or strip. ● Let us supply *your* needs. ***Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.***

STEELMAKERS to the Electrical Industry

Allegheny Ludlum

WAD 5333

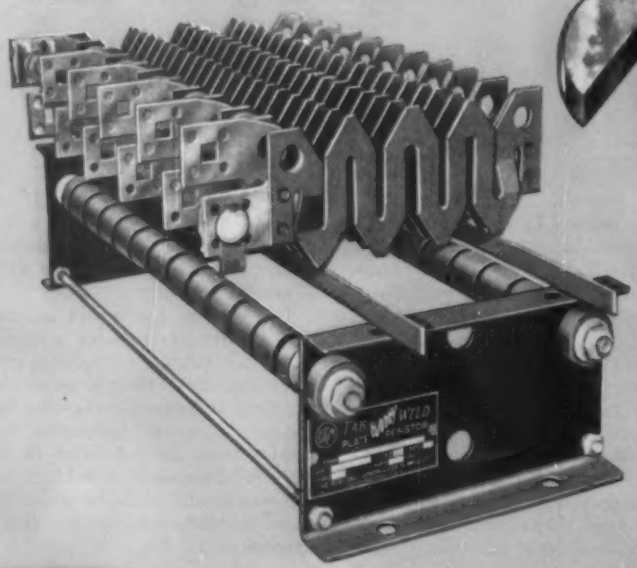
AL ®
STEELS FOR THE ELECTRONIC AGE

HANDS OFF!

EC&M TAB-WELD RESISTORS REQUIRE *MINIMUM* MAINTENANCE

Only EC&M TAB-WELD PLATE RESISTORS are both bolted and welded for constant current path. Unlike other resistors, they do not require periodic tightening of clamping nuts to compensate for loss of pressure caused by alternate heating and cooling. Grids are offset and mating ends are spot welded. Tap-plates are also welded into place at close intervals along the grid assembly.

This exclusive EC&M construction offers 4 big advantages on heavy duty motor applications: (1) stabilized ohmic value (2) no burning at grid-eyes or at tap-plates (3) easy tap-shifting for best motor performance and (4) long life with virtually no maintenance!



FEATURES THAT REALLY COUNT!

- Nonbreakable
- Corrosion-resistant alloy steel
- Negligible resistance change between cold and maximum working temperatures
- Offset resistor ends spot-welded
- No burning at grid-eyes
- No burning at taps
- Small adjustments in resistance value easily made
- Insulating spacers remain dimensionally stable
- No periodic tightening of clamping nuts
- All standard sections same size
- Double insulation to ground
- Fast connection to any tap-plate

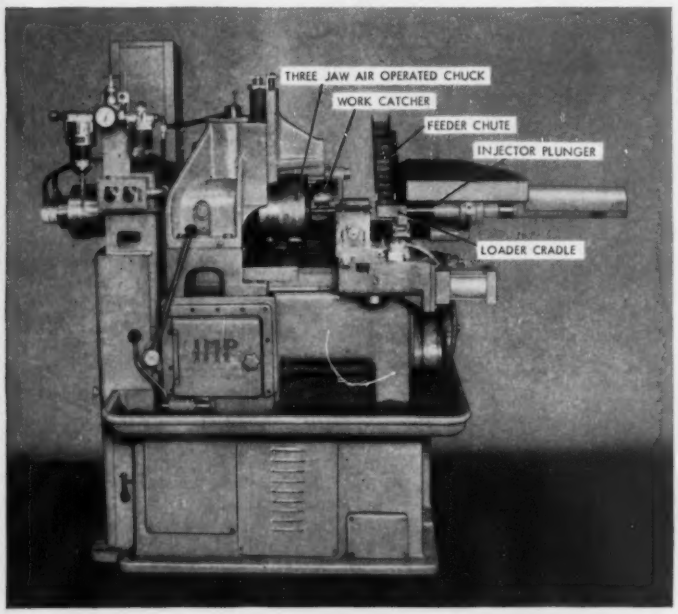
Write for illustrated Bulletin No. 942-B
Complete data on EC&M TAB-WELD RESISTORS

SQUARE D COMPANY
EC&M DIVISION • CLEVELAND 28, OHIO

7404

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



Lo-swing IMP AUTOMATIC LATHE MACHINES CAST IRON SLEEVES AT A FAST PACE

PROBLEM: To bore, face and partially turn cast iron sleeves on a full automatic cycle including loading and unloading.

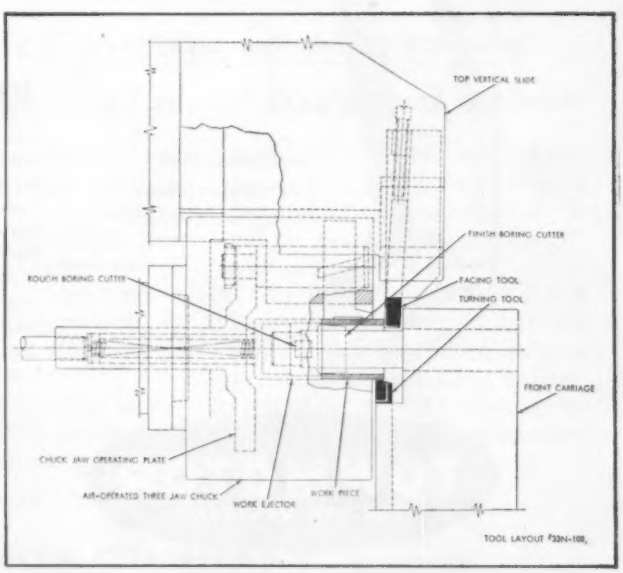
SOLUTION: A Lo-swing IMP Automatic Lathe was selected for this job due to its rigidity, compactness and productivity when equipped with Seneca Falls Automatic Injector Type Work Handling Equipment.

The cast iron sleeves, 1-13/16″ in diameter and 2″ long, are delivered at the machine direct from the foundry and are placed in the feeder chute where they flow by gravity into a loader cradle. In this position, the sleeves are picked up, one at a time, by the pneumatically operated injector plunger, and injected into the three-jaw air-operated chuck. The injector plunger remains in the advanced position until the chuck jaws automatically close, and then retracts to the relieved position.

The machining cycle starts with the Front Carriage and Overhead Slide tools approaching the work piece in rapid traverse. They then slow down to feed and finally return to the starting position in rapid traverse. Upon completion of the machining, an automatic work catcher swings forward, the chuck jaws are retracted and the work piece is ejected into the iron hand by means of the spring-loaded work ejector shown in the line drawing. The work catcher is then retracted and the finished piece drops into the unloader chute at the rear of the machine.

The entire operation is fully automatic, and a production of 147 pieces per hour is easily maintained. Our engineers are at your service to solve your automatic machining problems. Write for Bulletin N50F.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.



PRODUCTION COSTS ARE LOWER WITH Lo-swing

Can a Towmotor Solve My Handling Problems?



Read how a Steel Fabricator increased storage capacity 75%.

Ask for Job Study #145

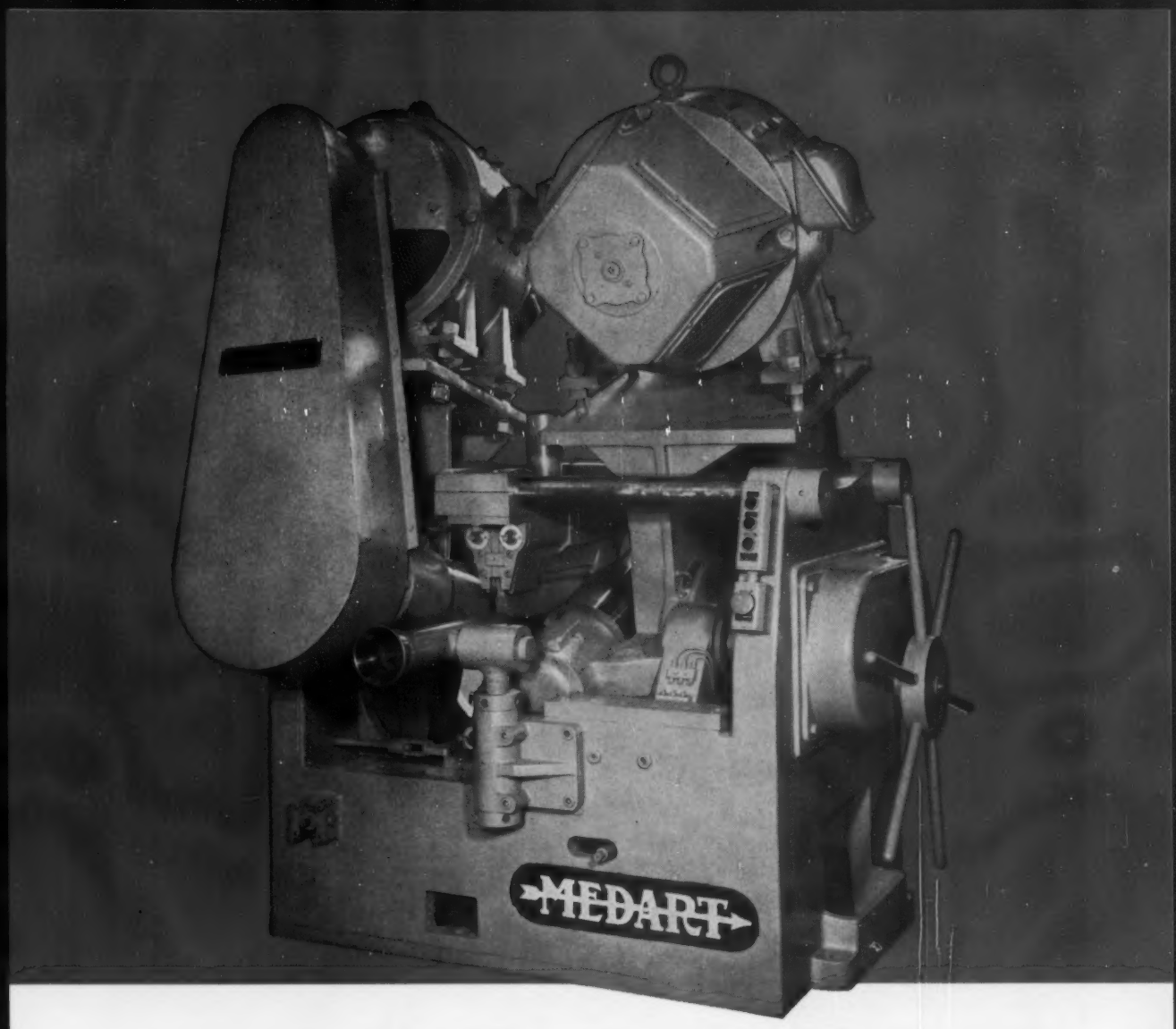
YES! **Towmotor Fork Lift Trucks and Towmotor Job-Planned Accessories are "tailor-made" for your particular application *in many ways.* Soundly engineered by materials handling specialists, the Towmotor line includes 15 different models and more than 60 interchangeable attachments, for *every* handling need.**

Ask your nearest Towmotor Representative to show you what Towmotor equipment can do to speed your materials handling, cut man-hour costs and make maximum use of storage space! . . . or write for Certified Job Studies covering *your* industry. TOWMOTOR CORPORATION, Div. 1510, 1226 E. 152nd St., Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG
®

America's ***best-engineered*** *fork lift truck*

THERE'S ONLY ONE FORK LIFT TRUCK CALLED TOWMOTOR



BLAW-KNOX MEDART makes what it takes

for high speed straightening of cold finished stock

Designed around the principle used in the famous Blaw-Knox Medart 2 roll Rotary Straightener, the 2 & 2 Universal Straightener is especially adapted for high speed applications. It is widely used in a direct production line with a draw bench for high speed straightening of cold drawn bars.

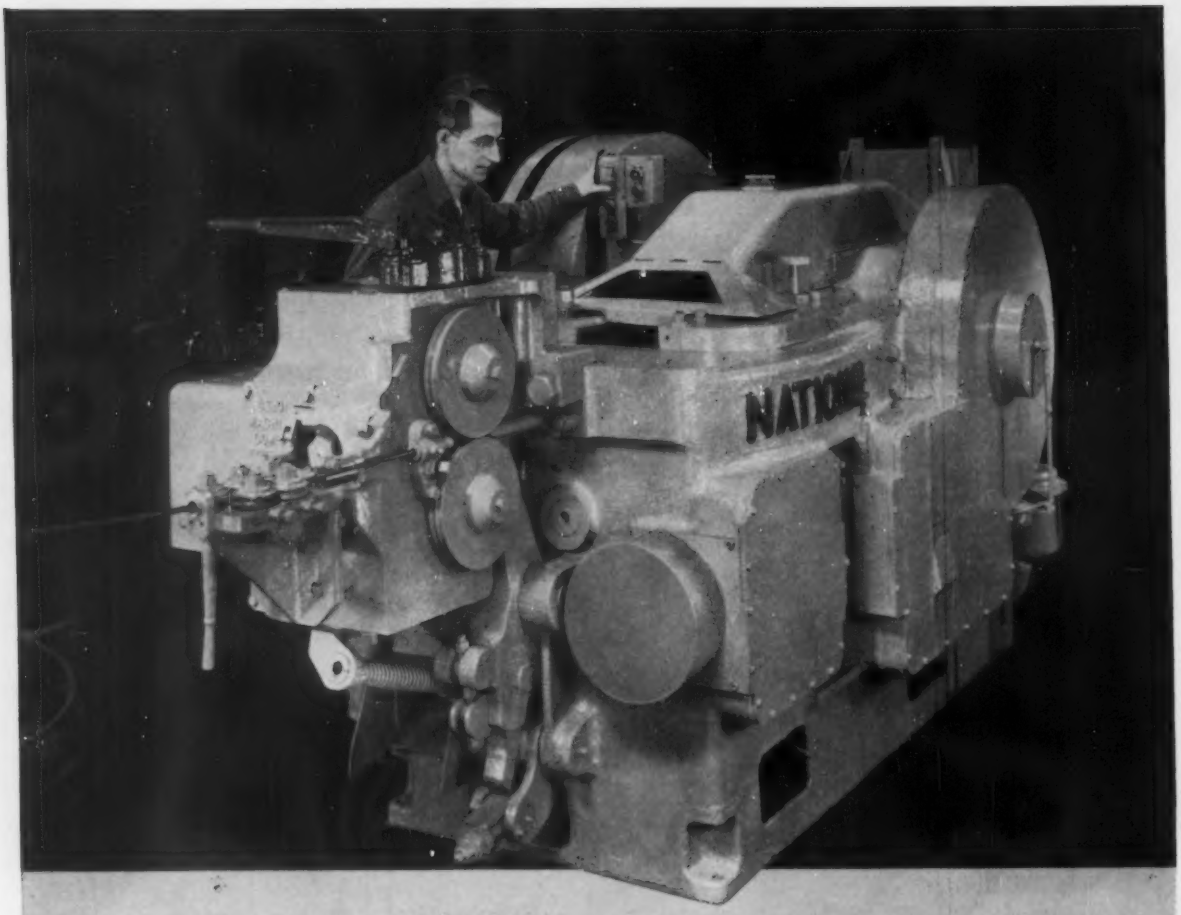
In this machine, each roll is driven by its own motor through a completely enclosed V-Belt drive. This simplified arrangement keeps downtime and drive maintenance to a minimum. What's more it provides for control of throughput rates by varying the speed of the motors. Roll speeds are synchronized by means of electrical interlocks between the motors.

Space requirements are kept to a minimum through compact design and the small number of working parts. This compact set-up simplifies discharge of work from the machine, making it ideally suited to shorter length workpieces.

The Blaw-Knox Medart 2 & 2 Universal Rotary Straightener and Polisher is available in sizes to handle bars and tubes in diameters of ⅛″ to 4½″. Contact us for detailed information, technical assistance or service.

50th Anniversary
BLAW-KNOX
1906-1956

BLAW-KNOX COMPANY
Foundry & Mill Machinery Division
Blaw-Knox Building • 300 Sixth Avenue
Pittsburgh 22, Pennsylvania



NATIONAL COLD HEADERS NOW AVAILABLE AT NEW HIGHER SPEEDS!

Standard-stroke National Cold Headers now operate at new higher speeds, as a result of dynamic counterbalancing and improved design of critical moving parts.

For example, the new ⅜" DSSD headers, like the one shown above, are producing 135 pieces per minute! Tool life is better and maintenance is still lower than on the earlier ⅜" models which operated at 100 pieces per minute.

Of course, all the time-proved advantages of National Headers still apply:

1. Easier, quicker to set up and adjust.
2. Compact construction; minimum floor space.
3. Simplicity – minimum of parts and movements.
4. Rigidity – for accuracy and maintenance of adjustment.
5. Die-engineering and development assistance.

We invite you to our plant to investigate how latest-design National Headers – and other National hot- and cold-process Machinery – can bring you new advantages through the fast, automatic production of your forged metal fasteners and components.

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO — SINCE 1874

DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS • BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS

Hartford Detroit Chicago

Bob Rossi, Chief Engineer, tells
Roy Johnson, Plant Manager





"We switched to Formbrite —and saved 12 cents apiece!"





.032" gage 70-30 Formbrite is used for this 4½" diameter rearview mirror head shown full size. Strip is $5\frac{1}{32}$" wide supplied in heavy coils for long press runs. Copper, nickel and chromium plating on a solid brass base provides a bright, rustless, long-lasting outdoor finish.



Peerless Rearview Mirrors. "Flight-Wing," below, and the newer "Director" model, left. Housings and mounts are chromium-plated zinc-base die castings.

This easy-to-polish, superfine-grain drawing brass has been slashing finishing costs in plant after plant, on all kinds of jobs. Now Peerless Accessories Co., of Mount Holly, N. J., reports:

"To our line of lighting and safety automotive accessories, we've recently added two rearview mirror assemblies. We had been using regular drawing brass for the dished head until your representative persuaded us to try Formbrite. Here are the results, based on a very careful cost study:

Finishing procedure using regular drawing brass	Present procedure using Formbrite®
1) Grease grinding or "cutting"	Not necessary with Formbrite
2) Buffing	Light buff
3) Copper strike	Copper strike
4) Nickel plate (.00045")	Bright nickel plate (.0003")*
5) Buffing nickel	Not necessary
6) Chromium plate	Chromium plate
Cost 27¢ each	**Cost 15¢ each**

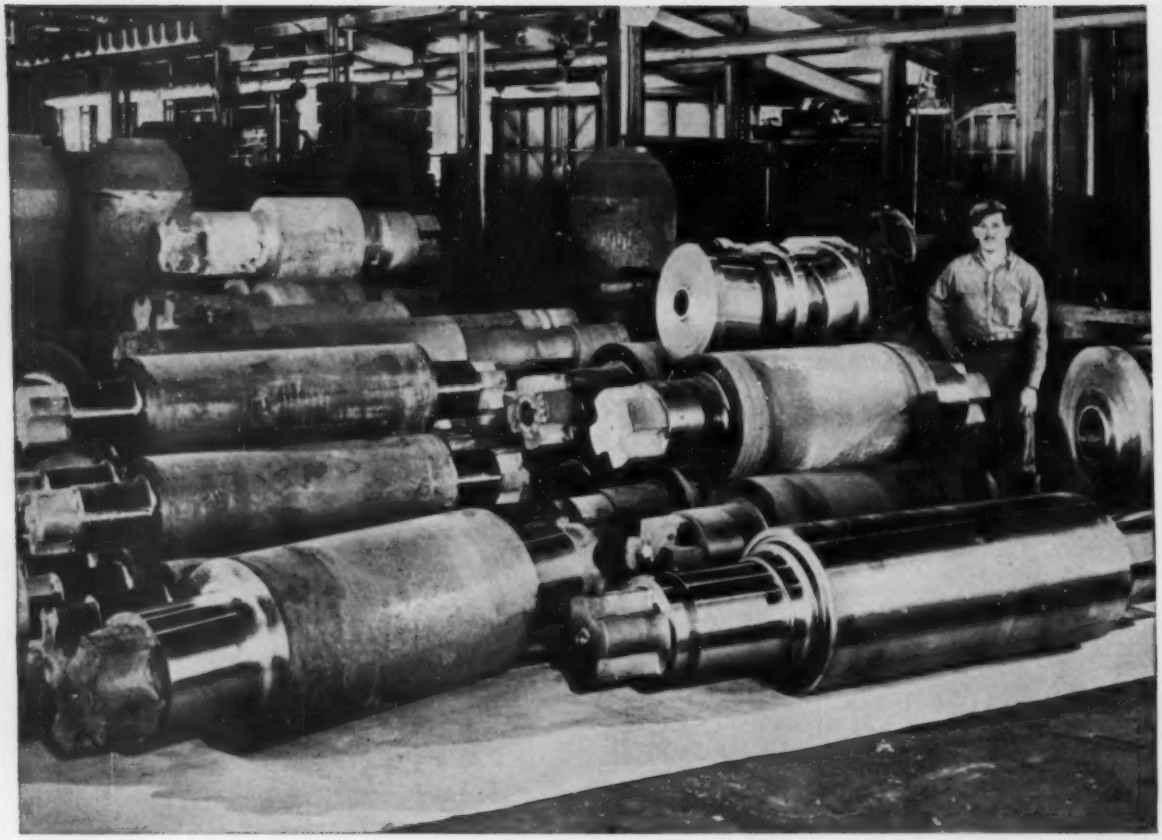
"That's a saving of 12 cents apiece. Multiply it by 3,000 to 4,000 a day and it becomes important money!"

*Formbrite's superfine grain made possible a lighter but equally serviceable plate of *bright* nickel

Surprisingly, Formbrite doesn't cost a penny more. Find out for yourself how its superfine grain, excellent drawing properties, strength, and scratch resistance can help you make a better product at lower cost. Write for Publication B-39. Better yet, ask us about a sample lot. The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 8870

Formbrite FINE-GRAIN DRAWING BRASS

an ANACONDA® product
made by The American Brass Company



Now . . . Many Types and Sizes of Rolls in ductile cast iron. Strong, tough and rigid, this useful engineering material makes metal-working rolls resist wear and give outstanding performance. Rolls shown were made by Aetna-Standard Engineering Co., Pittsburgh, Pa., a leading producer of ductile cast iron under the trade-name "Magaloy".

Ductile iron rolls give superior results ...reduce breakage, redressing, rolling costs

Many rolling mill operators say that reduced breakage is the chief advantage of ductile iron rolls.

Long service, without redressing, is an equally important benefit, however. In addition, these rolls resist fire cracking. They also produce a fine finish on the metal being worked.

As a result, users get more tonnage of quality rolled output . . . at low cost per ton rolled.

Today, ductile iron rolls are saving money for numerous mills rolling skelp, plate, shapes, structurals, bars, rods and billets. Because specifically desired properties . . . offered separately by conventional roll materials . . . are combined in ductile iron.

And note this particular advantage! Ductile iron rolls possess superior machinability as well.

Try ductile iron rolls. In your own mills. See first-hand how well they perform. Send for a copy of "DUCTILE IRON, The Cast Iron THAT CAN BE BENT!" It gives full details about this economical material, so write for it now.

Ductile Cast Iron gives you the properties that improve metal-working rolls

1. **Wear Resistance**
2. **Heat Resistance**
3. **Toughness**
4. **Rigidity**
5. **High Yield Strength**
6. **Superior machinability**

Despite its high wear resistance, ductile iron is easy to machine. In many fields, it's replacing more costly materials for improvement of products as well as process equipment.

DUCTILE IRON

ductile iron . . . the cast iron that can be twisted and bent

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street, New York 5, N. Y.



It's outstanding!

EVERY MANUFACTURER who tries Roebling high carbon flat spring steel discovers the same thing... that this spring steel is absolutely unexcelled for dimensional and mechanical uniformity... for speeding production and cutting down rejects.

You always *pay* for the best when you buy flat spring steel... make sure you *get* it by specifying Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.



Empire State Building, world's tallest building.

ROEBLING CF

Subsidiary of The Colorado Fuel and Iron Corporation

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 2340 GLENDALE-MILFORD RD., EVENDALE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4501 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • ROCHESTER, 1 FLINT ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • ST. LOUIS, 3001 DELMAR BLVD. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK





THE *first* FINISHED PIECE AND THE *last*...

tells the COST-CUTTING story of Chase® FREE-CUTTING Brass Rod!

Match-up piece number two, two-thousand or two-hundred-thousand with the *first* production piece machined from Chase Free-Cutting Brass Rod. They'll be identical twins! Same fine, smooth finish—same micrometer-perfect dimensions—same absolute duplicates in performance.

What's more, fabrication costs stay at rock-bottom all through the production run! The unsurpassed machining qualities of Chase Free-Cutting Brass Rod permit minimum tool rake angles, fewer dressings, higher cutting speeds and heaviest feeds. All without sacrificing quality or precision of the finished piece.

This rod comes to you precisely alloyed and tempered. Standard mill lengths are stocked in many different cross-sections for quick delivery from Chase Warehouses. Special shapes that *save even more* machining time can be made to order. Write, wire or phone today!

Chase

BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT
SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass, Copper and Stainless Steel

Atlanta Baltimore Boston Charlotte Chicago Cincinnati Cleveland Dallas Denver Detroit Grand Rapids Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York Philadelphia Pittsburgh Providence Rochester St. Louis San Francisco Seattle Waterbury

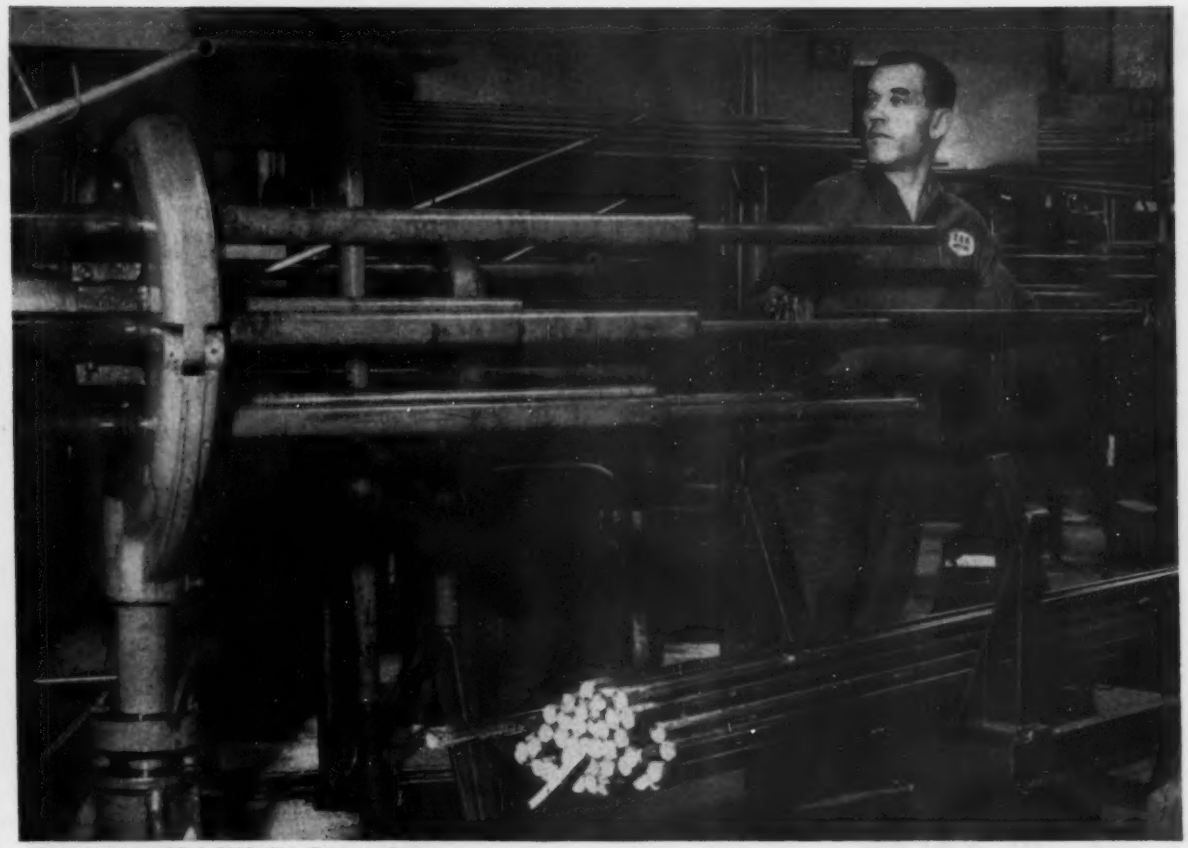


Photo Courtesy of Z & W Machine Products, Inc.

Quality Control

BUILDS INCREASED MACHINABILITY INTO YOUNGSTOWN COLD FINISHED BARS

Leading producers of thousands of high-quality screw machine products have made Youngstown Cold Finished Bars their regular specification for long trouble-free production runs. That's because they're quality-controlled throughout all production phases from ore mine to cold finishing.

They possess the best chemical composition, physical structure and surface conditioning—a result of Youngstown's half-century of steelmaking know-how. For improved machine finishes and increased tool life at greatly increased machining speeds, always specify Youngstown—your best assurance of quality and product uniformity.

For additional help or information call our nearest District Sales Office today—or write directly to our Home Office.

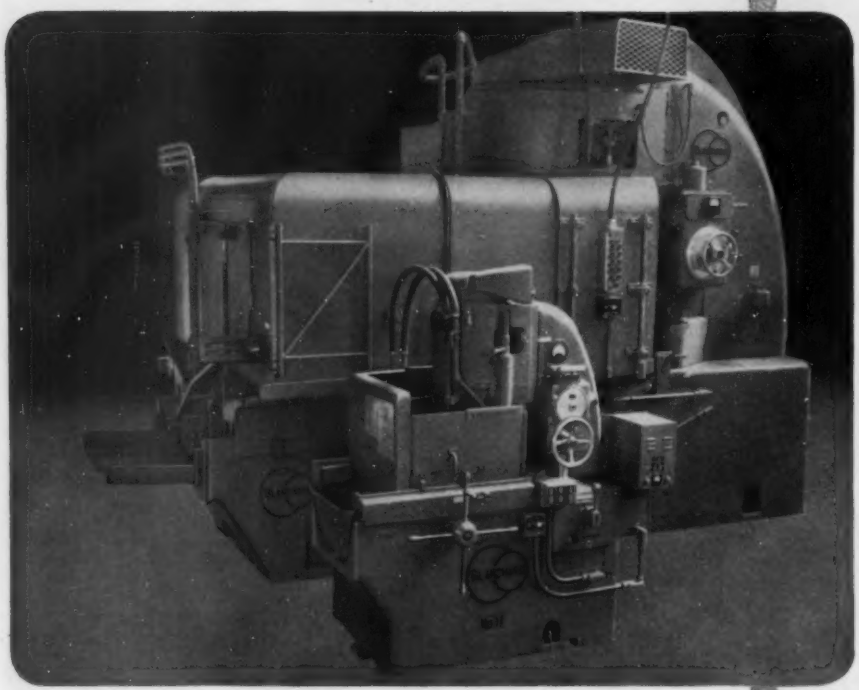
QUALITY YOUNGSTOWN SERVICE

COLD FINISHED BARS

Youngstown
SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

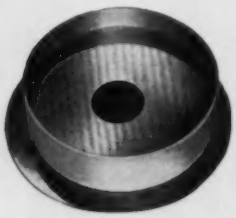
General Offices - Youngstown 1, Ohio
District Sales Offices in Principal Cities



V-488



Tiny watch gears, pinions and ruby bearings — flat and parallel — to a dimension tolerance of .0002″.



To 3 micro-inches and flat within *one* light band.

Please give us a chance!

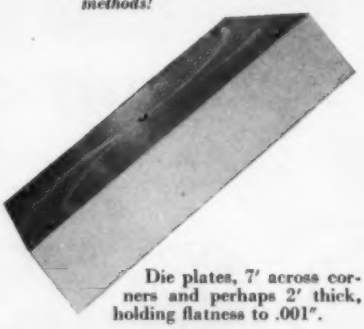
We *know* we can do *your* flat surface jobs. We've done them all — tiny watch parts . . . steel plates 7 feet across corners . . . copper and ceramics . . . *perfectly*. Just give us the correct wheel . . . (Blanchard wheels are preferable).

Blanchards regularly grind surfaces flat to within 2 to 4 light bands, parallel to less than .0001″, with dimension tolerance of .0002″ and surface finish to better than 3 micro-inches.

Honest, we Blanchards (15 models) work fast and inexpensively — whether the job requires precision grinding or rapid removal of stock. Give us a chance to prove we're the best investment you ever made.



Hardened steel machine tool ways, 2½″ x 3½″ x 50″, ground on 6 sides, flat within .001″ with surface finish of 5 micro-inches — *5 times faster than other methods!*



Die plates, 7′ across corners and perhaps 2′ thick, holding flatness to .001″.

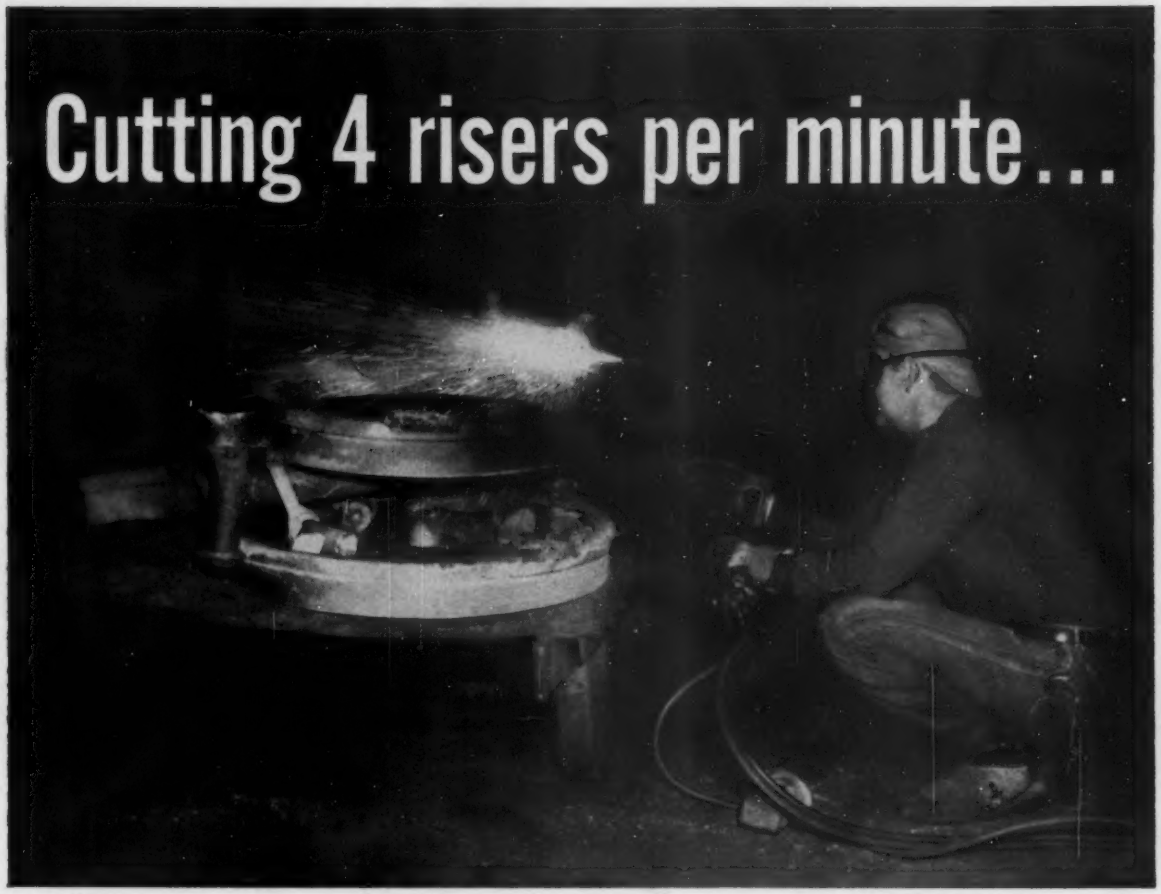


Send for free copies of "Work Done on the Blanchard" (fourth edition), and "The Art of Blanchard Surface Grinding".

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

Cutting 4 risers per minute...



Lightweight and easy to handle, this OXWELD powder-cutting blowpipe makes fast work of risers.

Powder-Cutting speeds removal operations 300%

Removing risers from stainless steel castings need no longer be costly and time consuming. Pictured above is a typical powder-cutting operation at the Ohio Steel Foundry Company, Springfield, Ohio. Here, 2 by 4 inch thick stainless steel risers are removed by powder-cutting in only 15 seconds. By methods previously used, this operation took up to four times longer.

In the powder-cutting process metal powder is automatically injected into an oxygen flame to increase the flame's heat and severing action speed. The powder process is helping users gain new efficiency and speed in the removal of gates and risers, sand incrustations, and casting defects.

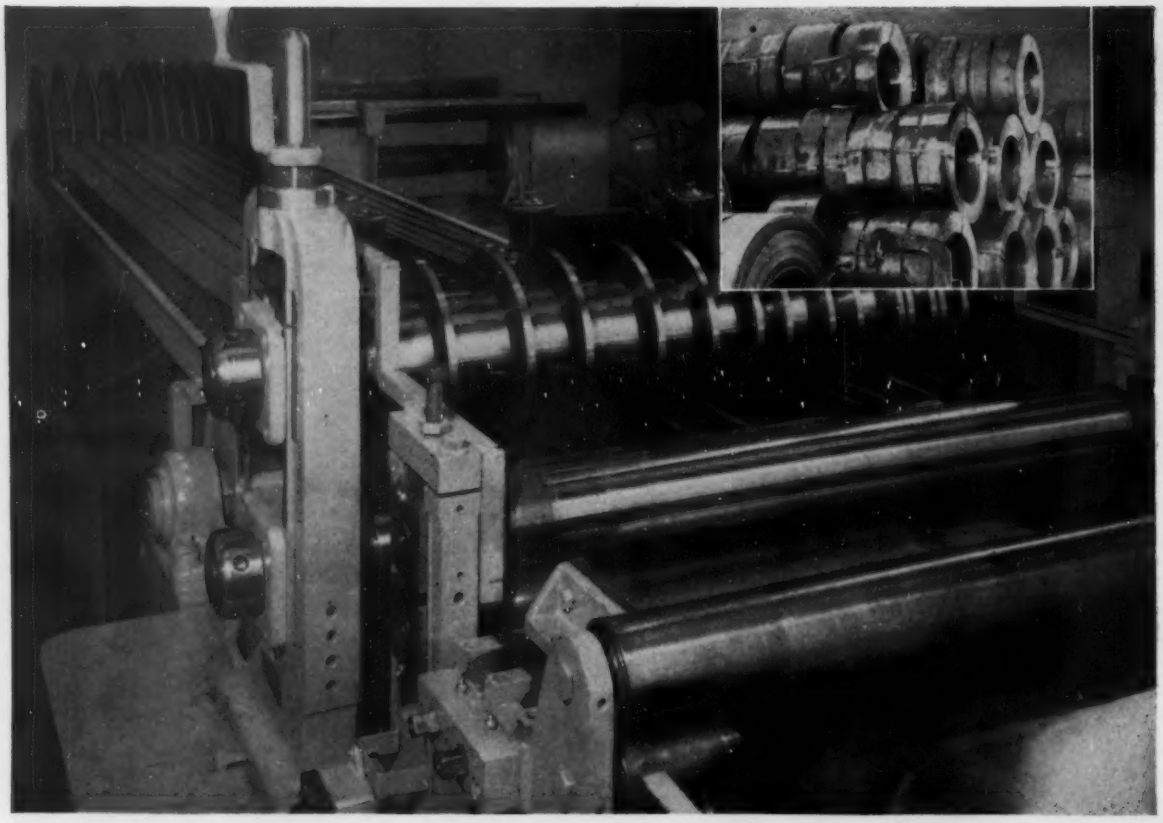
The powder-cutting blowpipe used in this operation, an OXWELD AC-4, is designed for hand cutting of oxidation resistant metals such as stainless steel, chrome alloys, and cast iron. Heavier apparatus is also available for manual and mechanized operations.

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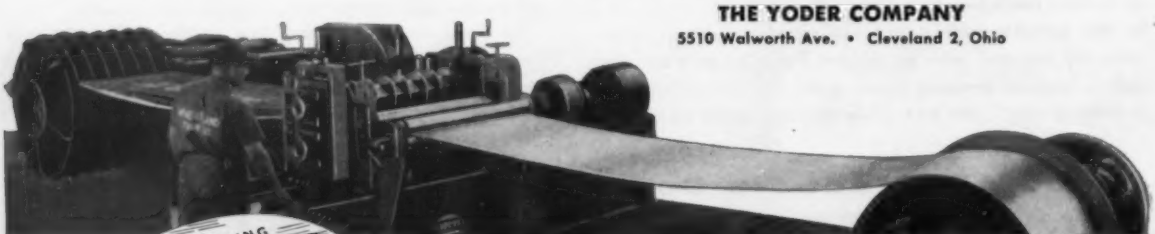
By doing your own slitting, you may easily save $12,000 or more per year in slitting cost alone, on requirements as low as 100 tons per month.

But don't make the mistake of thinking this is the only saving or advantage enjoyed. Many owners realize equally important savings by being able to buy standard width coils competitively, from more numerous sources of supply—wherever they can get the best price and quality. Much quicker deliveries are also obtainable in this way.

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NEWSFRONT

Airport Construction: Ready For Takeoff

Civil airport construction and modernization gets a big boost in the form of U. S. funds, as the nation readies for the jet age in commercial flying. Present programs call for building 47 new airports at federal cost of $5.7 million; improving another 502 airports using $85.1 million in federal funds. Federal share of costs is generally 50 pct.

Bar Prices Tied To Scrap

A midwestern independent bar producer, in light of the currently high scrap market, has started tieing his prices to scrap cost. Escalator arrangement used is based on delivery date to customers. The tie-in pricing arrangement goes for both hot-, cold-finished bars.

Oxidation: Sometimes an Asset?

Among your believe-it-or-nots, please note that oxidation can sometimes be an asset. Recent tests show that rupture life of a number of high-alloy steels and superalloys is longer in a normal air atmosphere than in either inert gases or a vacuum. Without a definite explanation, best current supposition is that oxide film may actually promote strength.

New Thermocouple Stirs Interest

Heat treaters concerned with temperature uniformity are showing lively interest in a new thermocouple for reducing-atmosphere, high-temperature service. Tested under common commercial heat-treating conditions, the couple shows excellent stability over a range of 2000°F. Anticipated advantages include better control, virtual end of ruinous overheating.

Taking the Long View on Plate

Current steel plate shortage could continue for years. Anticipating that it will, one big plate user has been spelling out for steel companies what it believes demand will be a few years hence, and asking them to boost capacity to meet it. If shipbuilding gets another shot in the arm, demand on already overtaxed facilities will zoom tremendously.

From Sweden, New Oxygen Process

Glowing reports of a new Swedish technique, known as the "Kal-Do" rotary oxygen process, are further freshening interest in oxygen steelmaking. The process involves a rotating furnace tilted at an angle for agitation, increased melt-surface exposure to oxygen. One benefit claimed is increased efficiency. Others are lower cost, savings in iron, maintenance of almost constant carbon content.

Barrel Finisher Saves $40,000

Barrel finishing is becoming less a tricky art, more a science through development of new equipment, new forms of finishing media. Using a unique machine that adds reciprocating linear motion to the usual rotary action, a business-machine maker salvaged $40,000 worth of heavily burred type faces destined for scrap. Same firm has found numerous other uses for machine in cutting costly hand finishing.

Machinability A Mighty Factor

Never neglect machinability—it can in some instances outweigh costs in material selection, as automotive people underscored again this week. One major passenger car builder cites better machinability as its sole reason for switching recently from aluminum to magnesium in a major automatic transmission component. Savings in machining time alone reportedly justified the substitution.

Sheet Squeeze: Still to Come

Because automotive demand for cold-rolled sheet hasn't been up to expectations, some fabricators are feeling falsely secure. But insiders say the big squeeze is yet to come. They see December as the critical month, with demand piling up big enough for at least a four-to-five week carryover early next year.

Bullish on Expansion

Are you planning bullishly enough for the future? GM economists foresee a 15 pct rise in population by 1966, with free spending, 20-to-30-year-old segment rising even faster. They see disposable income at $200 billion by then.

good start



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RESTRICTED SPECIFICATION COLD ROLLED STRIP STEEL
Processed to meet special gauge tolerances and provide special finishes and physical properties . . . solves many fabrication, cost and performance problems.

In figuring production costs, a metal fabricator has the right to depend on good performance with the product of the strip steel supplier of his choice. To insure the performance needed to provide the best end-product cost, it sometimes pays to buy restricted specification cold rolled strip steel. Although the initial cost might be somewhat greater per ton of steel, many examples can be cited to illustrate the economy in such a practice when end-product costs are facts and not estimates.

Consider the case of the West Coast manufacturer who was purchasing coil stock (sold as cold rolled strip steel) for a forming operation where close gauge tolerance was not of greatest importance. (However, the drawing quality, because of chemistry, was not uniform and die costs and rejects were causing expensive down time and yield losses.) Switching to a **CMP** restricted specification strip, the manufacturer obtained a uniformity in coil after coil that eliminated these problems and provided an end product cost much below his former cost even though his initial steel costs were higher.

For a better finish, both on the product and on the cost records, it will pay you to check your requirements with **CMP.**

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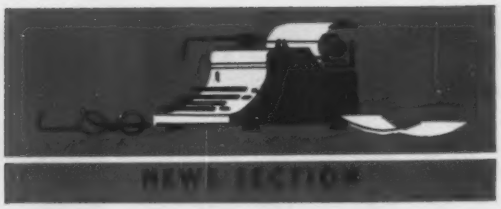
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FIRE: Beat It To The Punch

Fire losses in metalworking plants skyrocketed 1600 pct in the last decade . . . Many modern plant designs have hazards . . . Prevention means planning—By G. G. Carr.

◆ NEARLY ALL industrial fires "could have been stopped on the drawing board, in the executive office, or over the conference table long before they got out of control."

Thus the National Board of Fire Underwriters puts its finger on the best way to reduce the staggering losses caused by industrial fires.

The old "ounce of prevention" rule applies as much to industrial fires as to any other problem. For metalworking, the stakes are high. For instance:

A recent study by the Underwriters group shows that fire losses in metalworking plants are up 1600 pct in 10 years. Between 1942 and 1953 there were about 175 large-loss fires causing damage of $250,000 or more in metalworking plants and a total loss of $150 million. This compares with 18 large-loss fires costing $8.5 million between 1931 and 1942. And the upward trend continues.

Pyramiding Damage

Further, dollar figures come nowhere near to the actual loss. Big industrial fires have sweeping effects on thousands of people directly and indirectly. It's estimated that indirect losses are five times higher than the physical damage to a plant.

Some of the increase is due to industrial growth, inflation, and high production. But the experts stress that the vast amount of fire damage flares from failure to follow tried and true prevention methods.

Fire prevention is spectacular only when it doesn't work. But you can minimize fire danger by a well-planned program persistently carried out. Expert advice is yours for the asking from your local fire department, state board, insurance company, and suppliers of protective equipment.

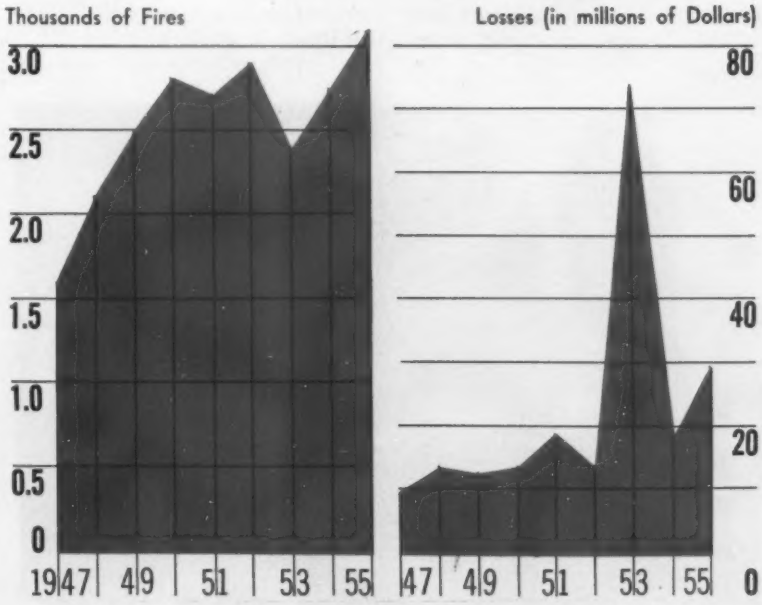
Unfortunately, modern metalworking has some built-in trends to fire risk. Major ones include the trend to bigger and bigger plants, preference for straight-line manufacturing with very large areas of unbroken floor space, and the accelerating movement to small town and country plant sites. But wise planning can minimize these risks.

Sprinklers A Must

Your best start in fire protection is to build it in. If you are putting up a new plant, insist on fireproof construction. But remember that a so-called fireproof building can make a fine oven if fire breaks out inside.

You shouldn't have to be sold on sprinklers. In most cases, in either old or new buildings, complete sprinkler protection will

What FIRE Costs Metalworking



1953 includes General Motors Detroit Transmission plant fire with estimated loss of $45 million.
Source: National Fire Protection Assn.



FIRE

How To Prevent It

Check with underwriters before building.

Insist on fire wall segregation.

Train employees in fire prevention.

Watch ventilation in hazardous areas.

Provide easy access to fire doors.

Check raw material analysis and storage.

Watch sprinkler maintenance.

amortize itself through lower insurance rates. And make sure it's complete; a fire can start or spread anywhere. If you're making alterations, watch that new partitions or shelving don't screen off sprinkler spray.

If water sprinklers would be dangerous in some areas, use automatic CO_2 or similar dry systems.

Before breaking ground for a new plant, doublecheck your site. This is particularly important if the proposed location is in a small town or rural location. Decentralization has many charms, but the price for these charms is all too likely to be small-town fire departments, insufficient hydrants, if any, and sparse water supplies.

Essential Steps

It's a good idea to have blueprints checked by fire prevention experts. But there are a few essentials for any plant, new or old:

1. Different processes should be segregated by fire walls or at least fire doors.

2. Machining and metalfinishing areas should be in separate buildings if possible. Where not, different operations should be enclosed with standard fire walls extending to the roof and having a parapet beyond the main roof level.

3. Your roof is the most vulnerable part of the plant to hot gases and flame. Roof collapse is a common and highly dangerous occurrence in industrial fires. Roof barriers between trusses are a must, regardless of type of roof. Sliding skylights or vents between trusses are strongly recommended.

4. Storage areas should be placed and built to provide proper protection to the materials stored in them.

If your plant is already built, materials are a good place to start a fire prevention program. List all materials used throughout your plant, not forgetting maintenance and packaging materials. Include in your list the form in which these materials are used. You don't usually think of metal, for example, as inflammable, but in a finely divided state it reacts just like any powder or dust.

Protect Your Paperwork

Insist that raw and finished materials be separated from each other and from materials in process. What won't burn will often buckle at high temperatures. And fine finishes can be ruined even when not in direct contact with flame.

Check quantities on hand. Is it really necessary to keep all that solvent in the plant, or is more just a phone call away?

Insist that important papers and all blueprints, plans and drawings be returned to fire-resistant files when not in use.

At this point it's a must to call in your key people, brief them on your fire prevention plans. You can bank on employee cooperation, but hazards and reasons for rules must be explained, and need for reminders is inevitable.

Heat is a constant accompaniment to metalworking. And so are volatile materials. The combination can be deadly. Be sure that



DAMAGE costing $250,000 or more in metalworking plants and a total loss of $150 million resulted from about 175 large-loss fires which took place during a recent eleven year period.

Keep continuing watch on all special hazards.

Install fire detection devices where needed.

How To Fight It

Install complete sprinkler protection.

Fixed extinguishers in (1) all danger areas, (2) on machinery, and (3) in critical spots, control cabinets, etc.

Portable extinguishers containing carbon dioxide, dry chemical, foam, carbon tetrachloride, soda-acid. Sand buckets. Water buckets.

heat is kept away from sealed containers that might explode, that vapors from one part of the plant aren't airborne to hotspots, open flames.

The same applies to finely divided materials of all kinds. Grinding stands and polishing jacks produce large quantities of dust. They must be equipped with



collectors. Metal turnings and chips should be removed to covered storage at regular intervals.

Proper maintenance and good housekeeping are always desirable, doubly so in terms of fire prevention. A clean, orderly shop, with trash and waste in suitable containers, is a prime defense against fire. And a malfunctioning, overheated machine can be a prime fire cause. Belt-driven machinery should be watched closely against static electricity; clogged or misaligned belts can produce dangerous heat through friction. Consider using fire-resistant fluids in hydraulic lines, particularly near such hazards as die-casting machines, heat treating and melting furnaces. (See page 95.)

Welding and burning are essentials in almost all metalworking plants. The need for special caution should be obvious, but fire reports stress how often elementary safety practices are neglected.

Training Pays Off

Despite the best precautions, fires do start. And here is where foresight and training can pay big dividends. Fire extinguishers, hoses, and other equipment should be supplied at suitable locations, and every employee should know how to use them. Companies supplying these devices will be glad to help determine what kinds are needed where.

All firefighting equipment should be tested and inspected at regular intervals. If water to fire mains or sprinklers must be shut off or pumps disconnected for any reason, special permission should be obtained.

Employee training is a must, but kind and quantity vary from plant to plant. As a bare minimum, every worker should know how to report a fire, and be required to do so. It may sound elementary, but fire reports highlight how many major fires developed from small fires because they were not reported in time.

Larger plants, particularly in more isolated areas, often have private full-time fire departments. This is not always necessary, but consider having at least one full-time man assigned to fire prevention. Slightly smaller plants are advised by the experts to set up internal volunteer departments, composed of specially trained employees who will leave their regular duties when the alarm sounds.

As a last but most important step, be sure your watchman system is adequate. And make sure you have enough of them. Many a bad fire has blazed into an inferno simply because the watchman was making his rounds at the other end of the lot. In this connection, consider installing smoke or temperature-rise warning devices. There are several types available, and a system can easily be tailored for your requirements.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., The Iron Age, Chestnut & 56th Sts., Philadelphia 39, Pa.

What Causes Fires?

A periodic check in these areas where fires start most frequently may save your plant from possible disaster:

- **Overcrowded inventories; they invite spontaneous combustion, hinder access to trouble spots.**
- **Fuels, solvents, paints; improper use, storage and ventilation is dangerous.**
- **Finely divided materials; dust is an explosion hazard. Even steel particles burn readily.**
- **Malfunctioning, overheated machinery; oil and electrical fires start here.**
- **Poor housekeeping; trash and chip accumulations are danger points. Dispose of them quickly.**
- **Inadequate fire prevention equipment and training; employees who don't know what is available or how to use it are at a disadvantage in an emergency.**

GOVERNMENT

SAFETY: New York Tries The Soft Sell

Education and consultation approach substitutes for the "big stick" in New York State . . . New program well-received by industry . . . Small business is biggest proportionate contributor to accident toll.

◆ YOU CAN'T legislate safety. That's the experience and conclusion of top government, industry and labor officials in New York State at a conference on worker safety.

The conference, called by Gov. Averell Harriman, enlists industry support for a new state program of education and consultation rather than law enforcement by safety inspectors. Idea for the program came when it was realized that more than two-thirds of all industrial accidents in New York State are beyond the scope of safety laws. And New York statutes are generally among the most elaborate and comprehensive in the nation.

The new program permits no easing of enforcement of legal requirements, but puts major emphasis on education and prevention. State safety inspectors receive special training in safety education and accident prevention at the New York State School of Labor and Industrial Relations at Cornell University. They then work with plant management to set up safety programs aimed primarily at effectiveness and only incidentally at compliance with laws.

Heavy Burden

Program is aimed basically at small business, which in the aggregate accounts for the majority of industrial accidents. Says State Commerce Commissioner Edward T. Dickinson:

"More than two-thirds of all industrial injuries occur in businesses with fewer than 100 workers. Small business is thus paying most of the estimated national annual cost of $2.5 billion for occupational injuries. This is a burden that small business management cannot afford."

Despite intensive efforts, the industrial accident toll is still staggering. Last year, on-the-job accidents killed 14,200 Americans and injured nearly 2 million others. New York's loss in 1954, last year for which final figures are available, was 910 workers killed and 4400 permanently disabled to some extent.

Gov. Harriman estimates that in dollars and cents alone, the cost of industrial accidents in New York State is $750 million each year. Annual direct cost of workmen's compensation to employers in the state has averaged $300 million in recent years.

A Big Job Done

Management's safety efforts have been Herculean. One large company has cut its accident rate 93 pct in 25 years. But such long-range declines in industrial accidents are leveling off. Frequency rate has declined only 16 pct in New York since the late 1920s. There has been little change in the death rate in 10 years.

First phase of the "broader approach" is the new program of state-sponsored education and consultation. This program is already underway in the state's foundries, and has been well received from inception. Reports Larri Shifman, B. F. & S. Bronze Foundry Co., Brooklyn:

"Up to a few months ago, the visit of a state inspector was a rather uncomfortable experience . . . under the new program for the first time in my experience I had the benefit of top-notch expert advice on what to do to make my shop a safer place in which to work."

Foundry industry was selected for the first application of the new policy since it is the largest employer in the 25 industries in New York with highest frequency rates of accidents.

How To Make Safety Work

■ Major points brought out at the New York State conference on industrial safety included:

Necessity of making the foreman the focal point of all safety activities.

Labor-management cooperation and inclusion of formal safety clauses in labor contracts.

Importance of concrete management interest such as personal investigation of bad accidents, participation in plant inspections, and safety talks to employees.

Says Gordon L. Bowen, safety manager, American Bosch-Arma Corp.:

"This physical demonstration of (management's) interest is necessary in order to make safety-consciousness contagious."

PRODUCTION

MAGNESIUM: Making Good On Its Own

Civilian consumption tops military for second time . . . Expect the margin to be even bigger next year . . . Advances in alloys, and new techniques credited for the spurt—By *K. W. Bennett.*

◆ MAGNESIUM MEN are developing a hunting gleam in their eye. For the second year, civilian consumption of magnesium is exceeding military use, and it appears that the margin of civilian over military usage will be even stronger next year. To an industry that subsisted for years on progressively leaner Defense Dept. outlays for the light metal, this is good news, indeed.

Behind the pickup in civilian use are a number of factors, including (1) long time consumer education; and (2) impressive technical advances in the past three years. Conferees at the Magnesium Association meeting in Chicago had this to stay:

Alloys Up

Aircraft procurement of magnesium castings is up now and will climb next year. Magnesium men are producing casting cores of a complexity not attempted a few years ago. Sand castings are now held to tolerances of plus-or-minus .030 in. per in. and surface finishes are in the 100-250 micro-inch range. Castability is now regarded as equalling or, occasionally, even surpassing aluminum alloys.

Permanent mold castings in magnesium, another growing market, offer a 75-150 micro-inch as-cast surface finish and .010 in. per in. tolerances. Close kin to permanent mold castings, magnesium die castings are growing in favor with the auto and appliance industries. Shell molding is well along, offers 75-150 micro-inch surfaces. Investment castings have finally been licked.

In sheet and plate, the thorium alloys for high temperature use are moving in on the older aluminum and zinc alloys, and an industry which only three years ago threw up its hands at 600°F operating temperatures is now talking of projects in the 700-900°F range.

Still on the way is a newer magnesium-thorium alloy that will boost tensile strengths higher, that has reportedly tested for 100 hr exposure at 700°F. The new material will weld without preheating and when welded under these circumstances has responded well to stress-corrosion tests.

Electroplating of magnesium, too, is catching a large capful of second wind. One new technique allows electroplating of highly abrasive resistant nickel directly on magnesium. Military specs and technical society specs will be announced in the near future, covering anodic touchup surface treatments for electroplated magnesium. A chromic acid touchup for plated surfaces is under test.

As operating temperatures in which titanium castings can be used are rising, so are the allowable temperatures in which protective coatings for magnesium may be used. Silicone paints have tested out at 600°F successfully and the Air Force is still pushing experiments on this development.

Forming Hot Market

Most press forming of magnesium is hot forming, and many experienced fabricators recommend that both the magnesium working stock and the forming dies be heated to 600°F or higher. Hot forming isn't on its way out, but newer press techniques are being adapted to hot forming, including the hydropress. Chemical milling of magnesium, similar to the etching of an engraving plate, is advancing toward the commercial stage.

Magnesium production has been falling since the government concluded its stockpiling program, but consumption is on the way up, and there is a mild air of cockiness to many a magnesium man, much of it tied up with the increase of allowable operating temperatures in which magnesium may now be used.

Statistics Tell The Story

- **Magnesium shipments are again on the way up, even though the defense "take" is off.**
- **Bureau of Mines report indicates average consumption for 1946-1950 was 11,287 tons.**
- **Government stockpiling and defense buying under impetus of Korea pushed this to a peak of 46,843 tons in 1953.**
- **Without the stockpiling crutch 1954 consumption fell to 39,218 tons.**
- **But in 1955 consumption was up to 46,113 tons, and industry is sure that this will easily be topped in 1956 and 1957.**

TRANSPORTATION

FLYING: Do Company Planes Pay Off?

Empire Steel Castings finds aircraft brings in new customers, aids in servicing all buyers . . . Use for fast, emergency deliveries is an important advantage . . . Private planes can be rented or leased—*By P. J. Cathey.*

◆ SMALLER FIRMS are beginning to cash in on the dividends gained through owning and flying a company plane. They're finding that such benefits as increased sales, better customer service, and improved public relations justify the investment.

Business flying has gained tremendous popularity since the end of World War II. Number of private aircraft, reports the National Business Aircraft Assn., has increased fivefold in less than ten years. Last year there were 25,000 with some 13,000 being company-owned and operated. They logged 588 million miles while flying over 4 million hours.

Has Triple Advantage

The experience of a small Eastern foundry — Empire Steel Castings, Inc., Reading, Pa.—points up how company-owned aircraft can pay off. The firm, which recently purchased a new, large, twin-engine plane after using a single-engine craft for two years, finds private flying offers triple advantages.

"Our plane," states President MacCormick G. Moore, "has helped us broaden our market, improve our service with customers and provides us with safe, fast transportation."

The company's first aircraft traveled over 486,000 passenger air miles in 28 months. Since it went into service, Empire has gained new customers in Virginia, Tennessee, the Carolinas, Florida, Missouri and Texas. Many customers and prospects have been flown in to see the firm's newly-modernized and expanded facilities.

Another important chore for the aircraft has been flying technical personnel to assist firms in New England, the South and the Southwest with their castings problems. In addition, when there are customer calls for rush orders, the plane can transport up to 1500 lb of steel castings.

"Private" Special Delivery

Companies other than Empire have found how important the availability of such "private" special delivery service can be. When customers are in quick need of products enough pieces can be flown to them in a few hours to get production rolling, while the major shipment is still being packed at the warehouse. When firms have plants in several different areas trouble-shooters can be sent quickly to repair equipment and reduce downtime losses.

When used in conjunction with commercial aircraft, the company plane provides a versatile ferry service to and from plants. Customers and employees can be transported quickly and directly from municipal airports to factory site and flown to nearby cities for connections with cross-country flights. What's more, the company aircraft enables personnel to cut delay and travel time when going between points not serviced by regular commercial airlines.

Cash Register Value

The dollar and cents value of a business aircraft to a company located in an "off-airline" community is illustrated by the experience of Rynel Corp. of Sterling, Ill. The firm, established to produce fine pitch gears, first got interested in private flying about five years ago. Situated about 125 miles from Chicago, Rynel had once-a-day train service and no airline service. What's more, many of the points where its ex-



EMPIRE'S TWIN ENGINE Aero Commander, built by Aero Design and Engineering Co., is an all-weather ship with instrument landing equipment, radios and transmitters, and automatic pilot. It carries six passengers.

ecutives had business were difficult to reach by available public transportation.

Rynel officials decided to buy a company plane. Within thirty days the firm's order backlog had jumped amazingly — rising from $30,000 to $300,000. During the next two years the number of company employees had to be tripled.

While many firms seem to favor twin-engine aircraft, plane manufacturers provide a variety of types to meet all needs and pocketbooks. Such suppliers as Aero, Beech, Cessna, Piper, Fairchild, Taylorcraft and others offer one,



DUAL LIFE of Empire's passenger aircraft makes it available for emergency delivery of products like this 398 lb stainless casting.

two, and four engine craft designed for private flying. They range from two-seater models to those which can accommodate over 40 passengers. Prices are from around $5000 to over $500,000.

Besides outright purchase there are several alternate methods through which companies can take advantage of non-commercial flying. Most private airports provide a charter service for firms which want to make only an occasional flight. Planes can be leased on a long-term basis or bought under a lease-purchase plan. Leasing, of course, doesn't require a capital outlay and cost is tax deductible. Lease-purchaser acquires aircraft through installments over two or three years.

MANUFACTURING

MILLER: Mighty Unit Readied

Ninety-ton spar milling machine built for aircraft part production has 7¼ ton control center . . . King-size cutter has one to twelve simultaneous feed motions.

◆ CHALK UP for Uncle Sam's machines-that-win-wars reserve: a 90-ton spar milling machine with an 84 ft bed, representing about $5 million in development and construction costs. The giant, designed and built by Onsrud Machine Works, is the first of 18, largely scheduled for Boeing Aviation and the B-52 bomber program.

General Electric, which worked with Onsrud in developing the controls system, says this king-size milling machine is equipped with a super control system that offers from one to twelve simultaneous feed motions.

The huge tool is designed for production of aircraft wingspars, chords, and wing skins to be milled from aluminum slab at as much as 300 ipm carriage feed; carries 38 electric motors totalling 323 hp to operate its four cutter heads and carriage feeds and auxiliary requirements. The fully automatic operation of the unit is controlled by templates, but GE spokesmen at Onsrud hinted that numerical (tape) controls will probably be incorporated in later models. Bed length will be extended to 105 feet in subsequent versions.

The present template control system, for a machine with this number of simultaneous feeds, uses one selsyn for each feed motion; and each feed selsyn is mated with a second tracer selsyn moving along one of several templates. Even with this complex arrangement, head speeds are rated at 30 ipm to accuracies of .002 in. over the length of the bed.

With the 300 ipm horizontal carriage feed for use in milling heavy aluminum slab, chip output requires a screw type chip removal system in the bed.

The control unit for the brainy 90-ton giant weighs 7.25 ton, requires 39,000 ft of wire and cable; basically, all to control the operations of two 50/100 hp horizontal milling heads and two 60 hp vertical milling heads.

The bed of this mighty milling machine is 84 feet long—slightly less than one-third the length of a football field. Designed and built by Onsrud Machine Works, it is the first of 18. Bed lengths of subsequent machines will extend as far as 105 feet. The equipment is designed for production of aircraft wingspars, chords, and wing skins.



KING SIZE contour spar milling machine has bed length of 84 ft.

A "super control" system offers from one to 12 simultaneous feed motions. Milling speeds run as much as 300 ipm. Pioneer unit, developed at a cost of about $5 million, is controlled by templates, but tape controls probably will be incorporated in later models. Multi-drive feed system requires 12 one-hp motors.

TRANSPORTATION

FREIGHT CARS: In Bad Order

Steel, coal, aluminum among industries hit by car shortage . . . Heavier ore shipments would aggravate bottom scarcity . . . Attrition high—*By G. J. McManus.*

◆ FREIGHT CARS were never harder to get, say traffic managers. Steel, coal, and aluminum producers are among those being pinched by the car shortage. Hopper cars are the tightest but gondola and box cars are not far behind.

Here's how some are hurting: Aluminum Co. of America is 2½ trains behind on shipments of alumina from its Mobile, Ala., plant to the Northwest and Texas. Alumina must be kept dry and there are not enough undamaged cars to make up the trains.

DF Car Shortage

On mill products, Alcoa's problem is similar though not as bad. There aren't enough leakproof cars to meet shipping schedules of finished products. Before the current squeeze, Alcoa had been making considerable use of new DF (damage free) cars. These have built-in blocking devices, which simplify packing and loading. Now the company can't depend on getting the DF cars and has gone back to its old shipping methods.

Soft coal mines in West Virginia are down to about three days a week because of the shortage of open top cars. In central Pennsylvania, the mines are losing three days a month for the same reason. There is an overall shortage of 4000 hopper cars a day.

Steel mills are laying down finished products because of a lack of gondola cars. The shortage of hopper cars is bringing regular delays in receipts of ore. One Pittsburgh scrap dealer says he could not get the cars to ship 10,000 tons within the next 30 days. A mill traffic man says it's the worst he's ever seen. Another reports four and five day delays for cars and is doing more shipping by truck. U. S. Steel is juggling schedules to help hardship cases.

Bleak's the Word

Behind the snag is the long-term shortage of cars coupled with unusually heavy shipping needs. On both counts the immediate outlook is bleak.

Building programs are racing high attrition rates. The figures on hopper cars show just how fast railway equipment is going to the boneyard. Deliveries are running over 1000 cars a month but this August the railroads owned 12,000 less hoppers than they did last year. The situation is helped somewhat by the fact that 17,000 fewer cars are awaiting repairs.

Little help can be expected in the way of decreased shipments. The end of the harvest season may bring a slight easing but other areas show no sign of a letup. Soft coal production is nearly 10 pct over last year and industry sources say they have the demand to continue mining 10 million tons a week for the rest of 1956. Anthracite carloadings so far this year are 20,000 over 1955.



Source: American Railway Car Institute

Scrap:

Prices up, exports increasing Govt. survey indicates

Officials of the U. S. Commerce Department, now conducting a study of present and potential scrap supplies under orders from Congress, hope to have the first accurate long-range scrap inventory early in January.

Thus far, using only figures it normally collects, the Department reveals that the steady stream of scrap from this country to overseas customers is continuing to increase — and that the price of scrap in the U. S. is climbing.

What They Want

Survey will be broken down into two parts. The U. S. Census Bureau will collect figures on the amounts and potential amounts of so-called "prompt" industrial scrap generated by metal consuming industries as one phase. The second phase, to be handled by the Battelle Memorial Institute, is the more complicated and will attempt to analyze present and future quantities of scrap in the "obsolete" supply.

The Battelle survey will seek to put tonnage figures on: (1) Size of the iron and steel scrap inventory as of Jan. 1, 1956, along with the total available supply for the year by principal grades; (2) Estimated future demand, using average domestic consumption through 1964 by principal grades; (3) Estimated additions to the scrap reservoir through 1964, by principal grades, and (4) Geographic distribution of scrap at present and in the future.

There'll Be Delay

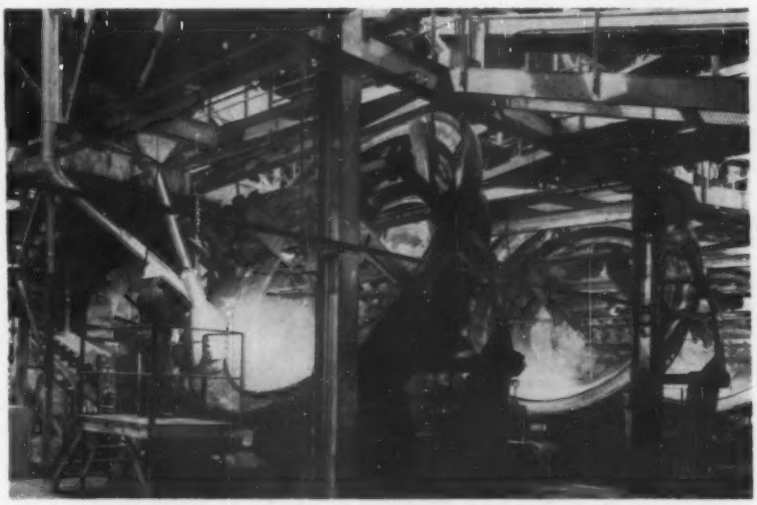
Secretary of Commerce Weeks, in an interim report to Congress required under the law, admitted that the survey had been held up, and says it may possibly not be ready now by next January 31.

Scrap inventory was ordered by Congress when the lawmakers were unable to decide whether the Commerce Department should restrict the flow of scrap overseas. Congress finally decided that it needed some accurate figures on supply before it could decide.

RAW MATERIALS

ORE: Now It's Jasper Pellets

Initial load arrives in Chicago . . . Smaller and more fused than taconite, they're product of new multi-million dollar plant of Cleveland Cliffs Iron Co.



FLYING SAUCER-like devices are agglomerating discs, or pellitizers used instead of the conventional balling drums, at Eagle Mills, Mich.

◆ IN THE hue and cry in mining circles over Minnesota taconite, not much has been heard from the jasper cousins across Lake Superior.

But they're now into the act. From the Upper Michigan port of Marquette, the first token load of pellets was shipped to the Chicago district by Cleveland Cliffs Iron Co.

The pellets are almost identical to tanconite pellets except that they are generally smaller and slightly more fused. The bulk of Upper Michigan ore being concentrated is non-magnetic. Processing costs are slightly higher because of reagents used but are offset by shorter haul to mills and easier crushing.

Multi-Million Plant

Ore at the mine averages 39 pct Fe and pellets, 63.5 pct Fe. The pellets came from a new multi-million dollar 600,000 ton per year concentrating and pelletizing plant operated by Cleveland Cliffs near Republic, Mich. The new development is divided into two parts—a grinding and concentrating mill at the site of the revived Republic open pit mine and a pelletizing plant at the settlement of Eagle Mills, about 30 mi. away between Republic and the port of Marquette.

The Eagle Mills' most unique feature is the "flying saucer" agglomerating disc developed by Wellman Engineering of Cleveland. Instead of a conventional balling drum, these discs form raw pellets in a huge open saucer rotating slowly at about a 45° angle. Second unique feature is a downdraft travelling grate in which the small pellets are burned and hardened at about 2400°F at the rate of 2000 tons per hour.

Republic is owned by the Marquette Mining Co., in turn owned by Cleveland Cliffs, Jones & Laughlin, International Harvester, Wheeling Steel, and Inland Steel.

INSTRUMENTS: Set For Expansion

A hectic decade of progress has seen measuring instrument sales double and capital outlays increase more than 150 pct . . . Yet the surface has hardly been scratched . . . Automation steps up the pace.

◆ ECONOMIC EXPANSION and the high cost of labor are two big reasons why mechanical measuring instruments are one of the prime growth industries of the post-World War II era.

Automation is almost synonomous with instrumentation. A new piece of equipment installed in a plant today is likely to have one or more measuring innovations built into it.

According to the 1954 Census of Manufacturers, shipments by the industry increased since 1947 from $423.4 million to $792.2 million—a rise of 87 pct. By the end of 1956, the figure will probably reach $808 million.

Gaged by spending for new plant and equipment, the industry is getting ready for bigger things. Capital expenditures rose 143 pct in seven years. In 1947, instrument companies spent $8.8 million for improvements; in 1954, the total was $21.4 million.

Research Important

The amount will have increased proportionately in 1956, which promises to be a record expansion year for industry generally.

Because of the specialized nature of instrument manufacture, the industry has a large number of small firms in its ranks. One hundred and forty-three new companies started in business between 1947 and 1954, bringing the total to 609.

But while the number of firms increased 31 pct, the number of persons employed increased only 13 pct. The total employed in 1954 was 68,500.

The industry is among the leaders in dollars spent for research and development. At least 20,000 different kinds of instruments are manufactured. With new processes and machine designs appearing almost daily, instrument modifications necessarily must follow.

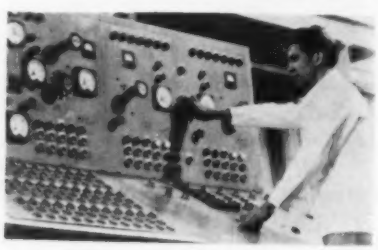
Significant progress is under way in such areas as process control systems, pneumatic controls, miniaturization, thickness control, creep testing, stress relaxation and temperature control.

Trends

The future will see more "interlocked" process control systems, permitting coordinated regulation of production. Continuous annealing and tinning, multiple fueling systems are areas where this is already being done.

A control system for regulating the thickness of moving steel is now in use on a five-stand mill capable of producing strip at 3800 fpm. Coming in for more attention are instruments which coordinate temperature, fuel-air ratio, pressure and BTU input. These have special value in metalworking operations subject to interruption for roll changes, stitching, welding and modifications.

Recording New Peak



Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., THE IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

B.F.Goodrich



Hot acid scrubs tomorrow's refrigerator

A typical example of B. F. Goodrich improvement in rubber

THAT sheet of steel will soon be a refrigerator—*gleaming white* because of the steaming hot acid bath.

To clean rust off steel so enamel will stick, miles of sheets are run through tanks of hot acid that eats off the film of rust. B. F. Goodrich made this low-cost method practical by developing a rubber and brick tank lining that stands the hot acid and the slicing, banging of fast-moving steel.

The sheets used to move over stationary skid blocks but these soon wore out with rubbing plus heat plus acid. Now B. F. Goodrich makes a series of small rubber rolls that really turn and the one remaining reason for frequent shutdown has been cured. What's more, the new B. F. Goodrich segment rolls cost one-third less than the old-fashioned type, yet last 3 times longer.

B. F. Goodrich specializes in rubber equipment to handle acids and other corrosive chemicals. Today you'll find B. F. Goodrich rubber covered rolls and rubber lined tanks, pipes and valves in the most modern plants. More important, you'll find rubber lining in some places where it has lasted 15 and even 20 years.

When you buy B. F. Goodrich lining you buy years of engineering background with it—experience that makes sure your lining will be exactly fitted to meet all the special requirements of your work. *B. F. Goodrich Industrial Products Company, Dept. M-778, Akron 18, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS

EXPANSION IN INDUSTRY

Tax-Am.:

Nothing new until early in 1957

Final decision on the fate of some $1.4 billion worth of requests for further fast write-offs for new steel capacity has been delayed.

Arthur S. Flemming, director of the Office of Defense Mobilization, who will make the final decision, says that he decided, after the question had been reviewed by the Defense Mobilization Board, the entire Cabinet, and the President, to wait until the Defense Department completes a review of its military program and provides ODM "with the new mobilization requirements."

Development of "new mobilization requirements" is being conducted along with the Pentagon's annual budget drafting, and won't be translated into tonnages of various metals and materials until about the first of the year. When ODM gets its new set of Pentagon war needs, it will ask the Commerce and Interior Departments to come up with new figures for the other two segments of mobilization planning—defense supporting and rock-bottom civilian requirements.

These figures will be matched against available capacity and planned industry expansion (without amortization), and if any gaps appear, it will be the signal for approval of renewed tax amortization.

Why?

Why has the ODM put off until next year its final decision on reopening fast write-offs? Washington speculation includes these possible points: (1) The Eisenhower Administration, already smarting from the "big business" attacks during the political campaigns, didn't want to make any moves before the November elections; (2) Despite a new Commerce Department study, there is opposition within the Eisenhower team; (3) Next year will be a better time to make a decision because of the new budget.

Another important aspect of the ODM announcement is that officials admit that while there will be no change in the original policy of granting tax amortization only to provide necessary defense, defense-supporting, and essential civilian capacity, the Defense Department is shaping its resurvey of its needs to "new" military concepts, including for the first time a possible atomic attack on this country.

A top ODM spokesman says that when the new Pentagon requirements are brought out, it may—and probably will—mean the needs for some materials will increase, and others will decrease.

Warm Reception in West

Cold Metal Products Co., has added a Los Angeles Mill Div. to its already established plants at Youngstown, O., Indianapolis, Ind., and Kenilworth, N. J.

The newest addition, built specifically to service West Coast markets, includes a 4-high strip mill, circular annealing furnace and all necessary processing equipment in 120,000 sq ft of floor space.

More Plate, Structurals

Armco Steel Corp., Middletown, O., recently applied for a certificate of necessity for its proposed expansion of the Houston Works, Sheffield Div.

The project calls for the expenditure of $118 million to increase output of heavy steel plate, structural shapes, and provide facilities for the production of seamless tubing.

Armco also applied for a separate certificate to cover a new $5 million coal field near McAlester, Okla.

Expansion Briefs

Reynolds Metals Co., Louisville, Ky.; new facilities added to wire and cable mill at Sheffield, Ala., for production of neoprene and polyethylene covered electrical conductors.

Lincoln Electric Co., Cleveland; expanding welding machine and electrode manufacturing facilities; cost about $5.5 million.

Kaiser Aluminum & Chemical Corp.; adding facilities for production of aluminum plate to sheet and foil mill being constructed at Ravenswood, W. Va.

Marion Malleable Iron Works, Marion, Ind.; will install completely automated heat treating equipment early in 1957.

Thompson Products, Inc., Accessories Div.; new facilities for testing fuel and auxiliary power systems for rockets; Roanoke, Va.; cost about $10 million.

Republic Steel Corp., Cleveland, O.; will install equipment for manufacture of plastic and irrigation pipe at Magnolia, Ark., plant.

American Machine & Foundry Co.; will build a new research and development center at Stamford, Conn.; cost about $4 million.

Stauffer Chemical Co., building a new plant to produce titanium tetrachloride at Ashtabula, O.

New York Twist Drill Co., Inc., N. Y.; new plant to double manufacturing capacity being built at Westbury, L. I.

International Business Machines Corp., N. Y.; plan new research center, Yorktown, N. Y.

Users of tubing for cylinder applications now you can have this new...

J&L Cold Drawn ELECTRICWELD

Tubing with a Special Smooth ID Finish



Reduces your overall production costs in applications like these . . .

- **cylinder tubing**
- **hydraulic and pressure tubing**
- **shock absorbers**
- **ordnance components**

This new drawn-over-mandrel grade tubing with its mirror-like inside surface finish is today busy helping manufacturers reduce or entirely eliminate costly machining on many applications and is being substituted for more costly types of steel tubing. For example, it may be used, without inside honing, for many cylinders through which plungers are passed.

J&L Cold Drawn ELECTRICWELD Tubing with a *Special Smooth* ID finish combines the physical advantages imparted by today's modern electric welding techniques with those of cold working. It withstands high internal hydrostatic pressures, carries heavy torsion loads, resists high-frequency vibration, and offers a favorable weight-to-strength ratio for applications in which loading occurs in all directions.

J&L Cold Drawn ELECTRICWELD Tubing can be furnished in its three specifications in OD sizes from ½ inch to 2⅞ inches and in wall thickness from 20 to 10 gage, 0.035 and 0.134 inch respectively.

This new booklet provides the information you need . . . specifications . . . tolerances . . . chemistry . . . mechanical properties . . . annealing . . . finishes.

Send for your free copy today!

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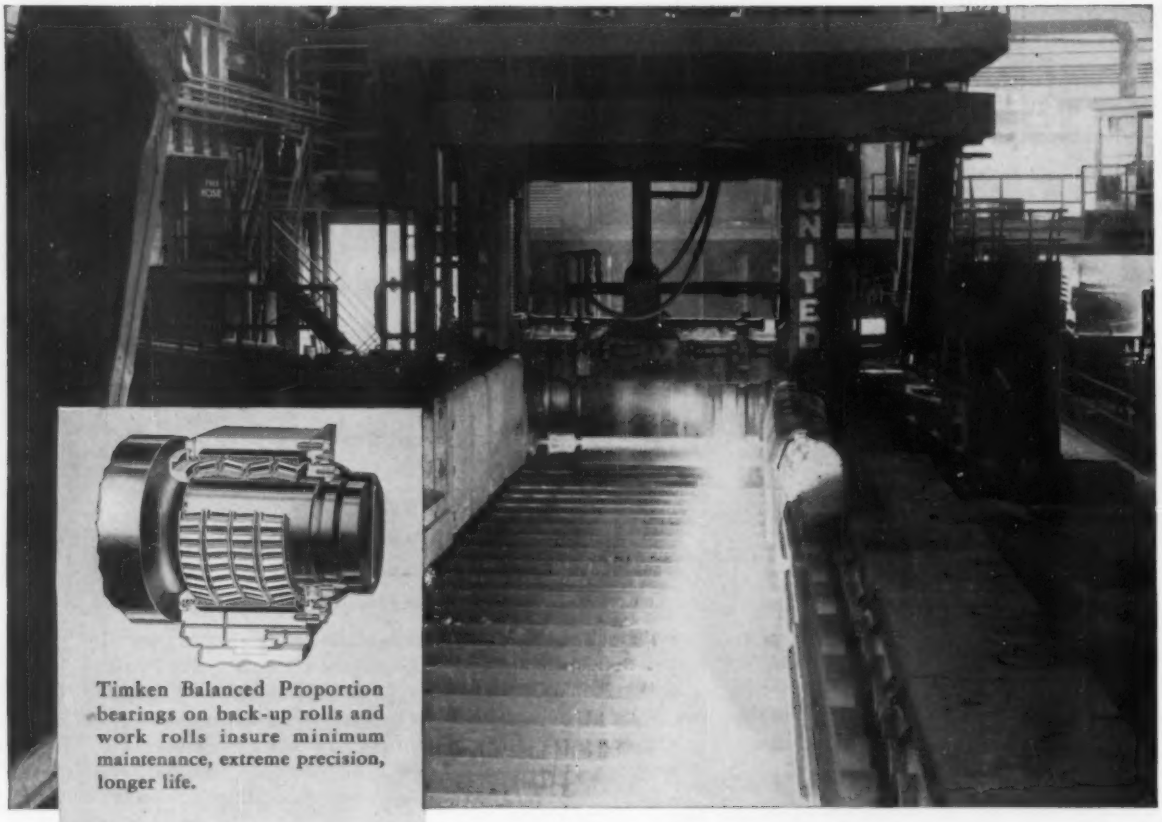
Send me a copy of your new Cold Drawn ELECTRICWELD Booklet.

Name_____

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Timken Balanced Proportion bearings on back-up rolls and work rolls insure minimum maintenance, extreme precision, longer life.

2-high bloom and slab mill starts faster, drives easier on TIMKEN® balanced proportion bearings

WITH the roll necks on this 2-high bloom and slab mill—built by United Engineering & Foundry Company for Pittsburgh Steel's Monessen, Pa., plant—mounted on Timken® balanced proportion bearings, friction is practically eliminated. This means lower starting resistance, faster acceleration, easier roll drive and higher rolling speeds. And because the balanced proportion design of Timken bearings permits larger diameter roll necks with no increase in bearing O.D., roll neck strength is increased up to 60%—load ratings up to 40%.

No special thrust bearings are needed; Timken bearings take radial and thrust loads in any combination. And full line contact between the rollers and races of Timken bearings gives them extra load-carrying capacity. Complicated lubrication systems are eliminated, too; Timken bearings permit simple, economical grease lubrication. Rolls can be changed quickly and easily. Wear is greatly reduced, long life is assured. Timken bearings are designed geometrically to *roll true* . . . and are precision-manufactured, under the most rigid quality controls, to conform to their design. Timken bearings show lowest cost per ton of steel rolled.

Always specify Timken balanced proportion roll neck bearings. For full details, consult our roll neck specialists. Write to: The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.



TIMKEN TAPERED ROLLER BEARINGS ROLL THE LOAD

TRADE-MARK REG. U. S. PAT. OFF.

REPORT TO MANAGEMENT

Ploughing Back The Surplus

By and large, it looks like industry is in for its seventh successive quarter of substantial increase in capital expenditures.

During the remaining 3 months of 1956 you can expect spending to reach an annual rate of $38 billion, compared to $36 billion in the third quarter. These outlays would bring expenditures for the full year to over $35 billion—23 pct higher than 1955 spending.

But part of this rise is accounted for by higher prices for construction and equipment. Capital goods costs in the second quarter of 1956 were almost 5 pct higher than the 1955 average.

As you might expect, manufacturers' programs, particularly those in durable goods, stand out among the increases.

Favorable trends in output and sales have kept the flow of income on the upward swing and are maintaining fairly stable conditions in the labor markets.

These conditions, coupled with the knowledge that both the steel and auto industries will almost certainly be in vigorous production during the next several months, have injected widespread confidence in the near-term outlook.

But What About The Stock Market?

This rosy picture may seem somewhat inconsistent with the faltering of the stock market in recent weeks, but the contradiction is judged in some upper-strata financial circles to be more apparent than real.

The stock market, they tell us, has recently been subjected to "special influences," many of which are technical in character.

The recent rise in interest rates, boosting yields on high grade bonds to levels exceeding yields on some comparable stocks, naturally caused investors' interest in stocks to wane.

Then throw in the uncertainties engendered by the Suez crisis and the coming election and you have at least a partial explanation of the weakness in security prices.

However, there is no apparent reason to suppose the attitudes of businessmen regarding the near-term economic trend have been affected in a similar manner.

Accountants Want Tax Changes

A list of 262 recommendations for changes in the income tax law submitted to Congress by the American Institute of Accountants is aimed at eliminating "many imperfections and uncertainties in the existing code."

The recommendations stress need for bringing accounting for tax purposes into closer conformity with accounting for financial purposes.

Taxpayers would be allowed to average income over several years. Such a plan would help small businessmen, professional men, farmers and others whose incomes fluctuate from year to year.

Ideas From Suppliers

Westinghouse Corp. has found suppliers a veritable gold mine of ideas. You might consider "working" the mine yourself.

After a tour of Westinghouse plants, supplier salesmen were asked to fill out "idea sheets." Submitted were 143 suggestions. Four already have been adopted at an annual savings of $15,970, and 90 other promising suggestions are being considered.

INDUSTRIAL BRIEFS

On Time . . . Berkeley Div. of Beckman Instruments, Inc., will develop and build an electronic time synchronizing system for Convair's guided missile program for more than a million dollars. Contract awarded by the Convair Div. of General Dynamics Corp., specifies equipment to cross-correlate operational flight test data.

Royal Acquisition . . . Worthington Corp. has acquired the manufacturing facilities from Royal Jet, Inc., of Alhambra, Calif., in exchange for Worthington common stock. Its products will include warm air furnaces and air handling equipment for year-round air conditioning systems designated to fit the climatic conditions of the western and southwestern states.

Wheeling, Dealing . . . Plume & Atwood Mfg. Co. has acquired the Kerosene Burner Div. of the Wheeling Stamping Co. in Wheeling, W. Va. The transaction includes machines, dies, designs, templates and active customer list currently used by the Wheeling Co., which will be moved to Thomaston, Conn.

Porter Carries Another . . . H. K. Porter Co., Inc. is acquiring the business of West Virginia Steel and Manufacturing Co., Huntington, W. Va. Announcement was made by B. Campbell Blake, vice-president and general manager, Connors Steel Div., Birmingham, Ala., with which division the operations of the new plant will be combined. Sales of the acquired concern are currently at the rate of $18 million annually.

Eau d'Diesel To Go . . . A new manifold designed for dispersing corrosive diesel locomotive fumes is now ready for the nation's railroads. It is an all-welded construction of rugged type 321 stainless steel supplied by Allegheny Ludlum Steel Corp. to Hanlon & Wilson Co., Pittsburgh. The stainless is noted for its corrosion resistance at temperatures up to 1700°

Chemical Reaction . . . Pennsalt Chemicals is doubling the size of its plant at Chicago Heights, Ill., a unit of its Chemical Specialties Division. The plant is a blending, packaging and warehousing facility for Pennsalt specialty products.

Out of Town . . . Norden-Ketay Corp., designers and manufacturers of electronic, electrical and mechanical precision control instrumentation and systems, has leased a new building in Stamford, Conn., to be used for executive offices presently located in New York City. It will also establish a central research laboratory for missile work.



"Well, Delaney, I see you picked up some dandy pointers at the plant management conference."

Rope Trick . . . 'Quality Unlimited," a 30-minute sound-color film describing the manufacture of wire rope and all operations in the production, from basic steel to the testing of the finished rope, has been made available by the Wickwire Spencer Steel Div. of The Colorado Fuel & Iron Corp.

Stockholders' Choice . . . Union Carbide and Carbon Corp., New York, has agreed to acquire all of the business and assets of The Visking Corp. on a basis that will provide to the stockholders of Visking one share of Union Carbide stock for each 2½ shares of Visking. Completion of the transaction requires approval at a meeting of Visking stockholders.

Administration Medalist . . . Clarence B. Randall, retired chairman of Inland Steel Co. now serving as special assistant to President Eisenhower, will be the first recipient of the Distinguished Service Award of the Americal Metal Market.

Airborne Adding Machine . . . A universal, high speed, airborne computer, until now destined only for the big bombers because of size and weight, may be miniaturized for use in Navy jet fighter planes, according to Philco Corp., Philadelphia. The digital computer may be used to consolidate the functions of many conventional airborne computers.

Meeting's Meat . . . Metal Powder Assn. has released proceedings of their 1956 annual meeting. Sessions were devoted to advances in all fields of power metallurgy. All technical papers, illustrations and discussions are included in the 130-page proceedings. Copies may be obtained from the Metal Powder Assn., 130 W. 42 St., N. Y.



How Great Lakes Steel *launches* quality

You're at 400 feet, banking for a good close look at the unloading operation of the *Ernest T. Weir*. She's packed to the gunwales, stem to stern, with ore—tons of iron-bearing food for Great Lakes hungry blast furnaces.

What's this got to do with turning out top-quality steel at Great Lakes? Plenty! For quality pig iron can only come from quality raw materials—like the *Weir's* rich cargo. And, of course, quality pig iron is the very backbone of top-quality steel.

Control of quality at Great Lakes begins right at the mines. In fact, each ore source is picked with painstaking care. Then, repeated checks in the mines—*double checks* here at the unloading docks—put the quality of Great Lakes raw materials beyond question!

It's that kind of control (from start to finish) that gives our flat-rolled products uniform quality—assures that they will reach our customers exactly when and as ordered. We're ready to talk your steel needs whenever you are.

GREAT LAKES STEEL CORPORATION

Detroit 29, Michigan • A Unit of

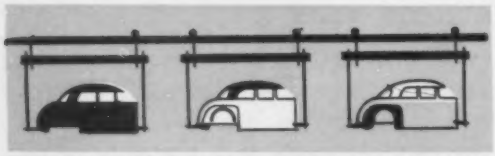
NATIONAL STEEL CORPORATION



District Sales Offices: Boston, Chicago, Cincinnati, Cleveland, Grand Rapids, Houston, Indianapolis, Lansing, Los Angeles, New York City, Philadelphia, Pittsburgh, Rochester, St. Louis, San Francisco, Toledo, Toronto.



TO ASSURE TOP-QUALITY OPEN-HEARTH STEEL . . . iron ore (shown stockpiled here), coal and limestone—all of known source and quality—are sampled and tested over and over again by Great Lakes Steel raw material analysts.



AUTOMOTIVE ASSEMBLY LINE

Will Chrysler's Big Gamble Pay Off?

The firm spent $300 million for 1957 model changeover . . . Will rely on restyling and sound product engineering to boost sales . . . Economies in new organizational setup will help offset costs—*By T. L. Carry.*

◆ DESIGNING, ENGINEERING and manufacturing of new cars is a gamble that gets more expensive every year. When a company decides to make a major change in its products, it costs anywhere from $200 to $300 million just to get in the game.

Consider, for example, Chrysler Corp. The firm laid out $300 million this year to bring out a completely new line of automobiles. No matter how you look at it, that's a lot of money and those who have seen Chrysler's new cars consider it well spent.

However, veteran observers on the Detroit scene can't help but feel that 1957 will be a critical year for Chrysler.

Time For Bigger Profits . . . This is not to say that the company will join the ranks of other producers who have gone out of business. It is merely to point out that the time is ripe for Chrysler to start realizing more in the way of profits than it has since the company introduced its first models in the Forward Look Line.

It was in 1955 that Chrysler changed its styling approach so radically. That was a good year for the corporation as it was for just about every other producer.

In 1956, the industry as a whole suffered noticeably from the previous year's selling binge but Chrysler, and Plymouth in particular, really took it on the chin.

The question is how long can the company keep pouring huge sums of money into new models?

The answer: probably for quite a while, due to its products and its organizational structure.

Signs of Health . . . From a product standpoint, Chrysler has built its reputation on good, sound engineering in its automobiles. In addition, its styling, which admittedly left something to be desired in years past, has now reached the point where the company's cars look just as good and in some cases even better than its competitors. So the company is now in a position where it can compete better with other producers.

From an organizational standpoint, sweeping changes have been made in recent years which also put Chrysler on a more even par with its competitors. There has been a concerted effort in the company to decentralize its authority.

The various divisions have become more autonomous and the whole organizational structure is stronger and more healthy as a result. Also, there are still a number of changes to be made which will make the company even stronger than it is today.

But after all is said and done, the question of public acceptance of Chrysler's products next year still remains unanswered.

L. L. Colbert, Chrysler president, is confident that 1957 has the potential of being a year equally as good as 1955, the previous record in the industry.



THE 1957 LINCOLN is slightly longer, somewhat stronger. Increased horsepower and other power assists are part of the engineering changes. The Landau four-door hardtop, (above) sports "Quadra-Lites," four road lights in vertical pairs. Lincoln has seven models in its new line.

AMC Has High Hopes . . . Over on the other side of town, George Romney, president of American Motors Corp., predicts that this country is in the early stages of a revolution as far as tastes in automobiles are concerned.

Mr. Romney sites the success of his company's Rambler as



"A wing and a prayer" ...and plenty of nuts and bolts!

ABOUT A THOUSAND assorted nuts and bolts keep this airborne performer in one piece despite the beating it takes show after show.

Obviously, the fasteners that keep the parts together have to be strong and flawless to stand up under the terrific stresses.

They do a big job, these standard fasteners. Take the automotive industry alone – over *10 billion* fasteners used last year!

RB&W—A MAJOR SUPPLIER TO INDUSTRY

A leader in the field for over 111 years, RB&W turns out the finest fasteners possible to meet the insatiable needs of automotive and other major industries.

Modern facilities, new techniques, long experience . . . all combine to make RB&W fasteners truly the "strong point of any assembly."

SEND FOR THE RB&W "FASTENER MAN"

If the product you make is assembled with fasteners, chances are the RB&W "Fastener Man" can find a way to save you money. He can recommend and supply the right standard fastener for just about every job. Contact your nearest RB&W office.



RB&W
111th year

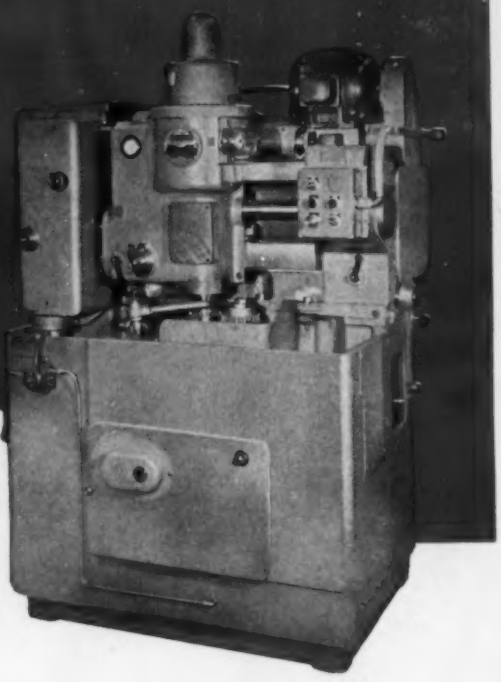
RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Plants at: Port Chester, N. Y., Coraopolis, Pa.; Rock Falls, Ill., Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver; **Distributors from coast to coast.**

RB&W FASTENERS - *Strong Point of any assembly*

fastest GEAR SHAPER EVER...

for gears up to 6" P.D.



FELLOWS
No. 4GS
GEAR SHAPER

No other machine combines such versatility with such speed and accuracy! Fellows' powerful No. 4GS Gear Shaper finish-cuts internal or external spur and helical gears up to 6" P.D., 2" face width... with nine cutter speeds from 98 to 635 strokes per minute available through stroke change gears!



At New Process Gear Company, for example, new Fellows No. 4GS Gear Shapers lowered production time 30% on the average, save set-up time by holding to 25% closer tolerances than other shapers.

Easily adapted to semi-automatic or fully-automatic production for large runs, the 4GS is ideal too for cutting a nearly infinite variety of non-involute shapes and contours quickly and accurately. Set-ups and adjustments are simple and fast.

For full information about the No. 4GS Gear Shaper and the Fellows Precision Line, just ask your Fellows Representative. And ask him about the Fellows Plan for deferred payment. Write, wire or phone any Fellows office.

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150 W. Pleasant Avenue, Maywood, N. J.
6214 W. Manchester Ave., Los Angeles 45

THE PRECISION LINE **Fellows** *Gear Production Equipment*

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
OCT. 6, 1956	59,727	20,728
SEPT. 29, 1956	44,753	14,339
OCT. 8, 1955	85,640	16,556
OCT. 1, 1955	120,665	23,869

*Estimated. Source: *Ward's Reports*

proof that more people are turning toward smaller and more compact cars.

He also says that the Rambler and AMC's tiny Metropolitan fit neatly into the pattern of smaller automobiles.

In fact, Mr. Romney says that if his company can sell 30,000 more cars in 1957 than it did this year, it will end up in the black. This would be a big accomplishment for the company which has steadily lost money since the merger of Hudson and Nash over two years ago.

Inventory Cleanup

Conditions have never been better from a dealer standpoint for the introduction of 1957 cars.

Dealers in some lines of cars are reporting actual shortages of 1956 models.

Automotive News reports that the spot shortages are not entirely due to the severe cutbacks in production this year.

In any event, this year's cleanup will represent the most complete job since 1954 when stocks fell to 200,000 cars before new model introductions.

Olds Revives Wagons

Oldsmobile is rejoining the ranks of producers in 1957 that will be offering station wagons to the public. The GM division abandoned station wagon production in 1950.

J. F. Wolfram, division manager, says that a recently completed expansion program makes it possible for Olds to get back into the market. At the same time, station wagons continue to increase in popularity. Presently, they account for almost 10 pct of total car production.

Olds will offer three wagons next year. Two will be in the 88 series and one in the Super 88.

Two of the models will feature a new note in station wagon styling. They are hardtops with no center post above the belt line between the doors.

Mr. Wolfram says his division expects to give other station wagon producers a run for their money this year.

Bodies for the wagons will be assembled by the Mitchell-Bentley Corp., in Owosso, Mich. Oldsmobile will send complete stampings for the assembly to the Owosso plant.

In addition, Oldsmobile is introducing a convertible in its lowest priced line.

More Aluminum Trim

C. F. Nixon, head of the electrochemistry department of General Motors Research Staff, says the auto industry will use more anodized aluminum because of the tight nickel situation.

The anodized metal is presently being used for such decorative items as grills on cars. But Mr. Nixon says that the shortage of nickel has increased the odds that manufacturers will use aluminum even more extensively.

AUTOMOTIVE NEWS

Radiators:

Stainless steel parts appear in 1957 model

Stainless steel radiator parts are being used for the first time in some 1957 model automobiles.

This new stainless application, developed by McCord Corp. and Allegheny-Ludlum Steel Corp., is the result of four years' research. At least one major automaker is scheduling 10 pct of its radiator production for stainless construction.

The parts are formed in a single draw from type 430 stainless —a straight chromium grade containing no hard-to-get nickel. McCord claims the new radiators are less expensive than conventional designs and they equal or surpass them in performance. Parts are .018 gage, thinner than most metals used in radiators.

THE BULL OF THE WOODS — By J. R. Williams



Case No. 42

Kemp Immersion Heating Gets Top Results for Signode Steel Strapping Company



How Signode Steel Strapping Co. tempers 650 feet of steel strap every minute

At the Signode plant in Sparrows Point, Md., turning out up to a thousand miles of steel strap daily calls for fast, efficient production line techniques. One highly important phase in the final processing is the tempering bath. Here, Signode called on Kemp Engineers to supply the 15 ton, gas-operated Immersion Melting Pot shown above. Now steel strap is uniformly tempered at the rate of 650 feet per minute.

Kemp Offers More Advantages

By installing Kemp Immersion Heating, Signode benefits in many ways. Unlike underfired pots, Kemp pots are *not* subject to *periodic* and expensive shutdowns . . . won't crack or break. They operate *continuously* at maximum heating efficiency with a *substantial* savings in fuel costs. Offer a greater heating surface, faster heat recovery, lower dross formation, even lower room temperatures. At the same time, this Kemp unit enables Signode to eliminate costly temperature override and open flame fire hazards.

Let Kemp Solve Your Problems

These same advantages apply to all types of melting or heating operations. Whether you are engaged in tempering, annealing, descaling, coating, etc., you can rely on Kemp Immersion Heating. Why not find out how Kemp Engineers can help you, save you money?



This 10 ton oval pot is typical of the many Kemp installations now in use. Features Kemp Carburetor, part of all Kemp equipment, to deliver complete combustion . . . without waste . . . without tinkering. One-pipe air and fuel feed reduces installation costs, simplifies maintenance.

For more complete facts and technical information, write for Bulletin IE 11 to C. M. KEMP MFG.CO., 405 East Oliver St., Baltimore 2, Maryland.

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ADSORPTIVE DRYERS • SINGEING EQUIPMENT



THIS WEEK IN WASHINGTON

Will Money Squeeze Be Tightened?

FRB privately worried because expansion borrowing hasn't slowed very much . . . New hike in interest rates may be made . . . Businessmen chafed that government doesn't curb its own spending—By G. H. Baker.

◆ TIGHT MONEY may get even tighter within the next few months. The credit-regulating Federal Reserve Board isn't saying so publicly, but some of its members are worried because borrowing for expansion hasn't been slowed up as much as the Board thinks necessary.

Families, as well as businessmen, are shelling out for the higher interest rates at their banks, savings and loan companies, and small loan companies. There are few reports of cancelled or postponed spending plans. As a result, it's entirely possible that the Reserve Board will tighten the money supply another notch by forcing up the interest rates.

As You Were . . . Although the Eisenhower Administration is doing all it can to slow up the roaring expansion plans of businessmen and consumers, the government itself continues to spend more money than ever before in peacetime—and without any comparable restrictions.

This free-wheeling spending by bureaucrats at a time when the country is solemnly warned that inflation is a serious threat chafes many business executives.

Not one government department or agency has cut back its rate of spending from 1955 levels, and almost all are planning to ask the Congress next January for more money to spend.

Selective Restriction? . . . As a result, some businessmen are asking the Federal Reserve Board why it is that businessmen, but not government officials, are expected to slow up their rate of spending?

So far, the Reserve Board hasn't come up with any answer. It continues the squeeze on business growth, but hasn't lifted a finger to check the mushrooming expansion plans set for government projects.

Trim Foreign Aid Fat?

Senate Foreign Relations Committee, suspicious that the U. S. foreign aid program is not as efficient as it could be, has hired the Brookings Institute to take a close, hard look at the way the giveaway program is run and recommend ways of trimming away the fat.

Brookings will report back to the Senate by early January. Whatever it recommends is expected to carry considerable weight next spring, when both the Senate and the House sit down to write a new foreign assistance program for the fiscal year starting next July 1.

Spur Machinery Sales

A $10 million loan agreement to assist more than 60 U. S. manufacturers to sell machinery and equipment to an Italian auto equipment manufacturer has been signed by the Export-Import Bank.

Loan was made to FIAT, of Turin, Italy, which produces automobiles, trucks, tractors, steel products, aircraft, and related equipment. The loan will be used to buy special U. S. equipment for modernization and expansion of facilities to produce autos, aircraft, and other products.

Tough Congressional Election Fight Looms

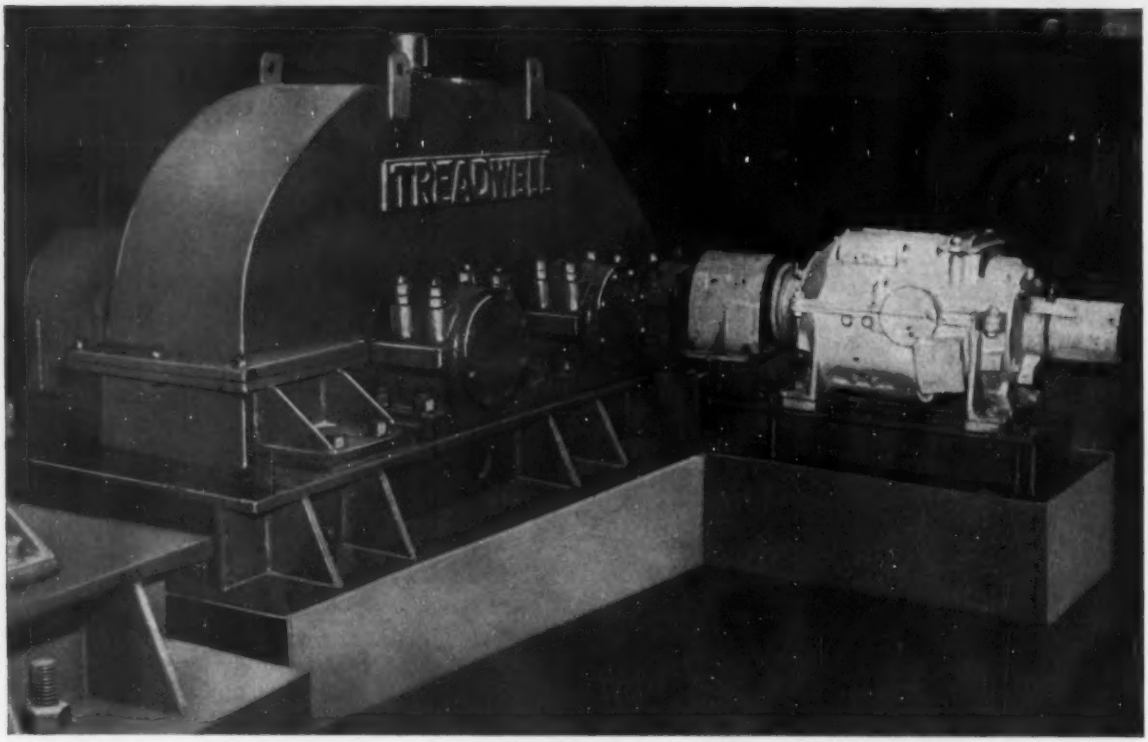
■ There's growing concern in Republican Congressional circles over their party's chances of regaining control in November.

GOP experts who've been testing the political winds report that, while Ike is a heavy favorite over Adlai Stevenson, control of Congress appears likely to remain in the hands of the Democrats unless a political "miracle" happens.

Political barometer shows: Traditionally Republican Maine filling one or two (one district being recounted) of its total of three House seats with Democrats. Republican Governor Langlie of Washington, thought to be a sure winner for the U. S. Senate over Senator Warren Magnuson soundly beaten at the polls. Rep. Richard M. Simpson (R-Pa.), fresh from ringing doorbells in the Pittsburgh area reports: "An especially tough campaign, particularly for the House."

Union political activity in the Maine election was a big help to the Democrats. AFL-CIO conducted telephone "get out the vote" campaign, transported voters to polling places and flooded mails with cartoons and pamphlets.

Treadwell



ROLLING MILL DRIVES FOR THE FERROUS AND NON-FERROUS METAL INDUSTRIES

These units are built with single, double, or triple reduction, depending on the special requirements of horespower and speeds.

They are furnished with single helical or herringbone gears and plain or antifriction bearings according to customers' specifications. Gear housings will be welded steel construction or steel casting as desired.

Manipulators, Mill, etc.
Mills, Blooming & Billet
Mills, Merchant & Bar
Mills, Rod
Mills, Sheet
Mills, Strip (Cold)
Mills, Strip (Hot) & Skelp
Mills, Vertical Edging
Tables, Mill

Tables, Tilting & Lift
Tables, Transfer
Transfers

Coilers & Reels
Conveyors, Coil
Drives
Ejectors, Furnace
Gauges, Shear, Saw, etc.

Beds, Cooling
Beds, Inspection
Bumpers, Furnace
Pushers, Furnace
Repeaters
Handling Equipment (Kick-offs, Pilers, Cradles, etc.)
Steel and Iron Castings
Ni-Hard and Ductile Iron Castings

BETTER TRADE MACHINERY

Treadwell Engineering Company

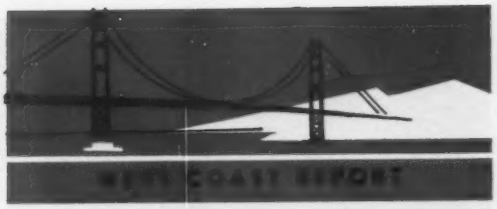
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Built-in Feature Aids Farwest Expansion

Rising rate of personal income reflects increasing productivity of area's workers . . . It's important motive force which will be factor in West Coast's future . . . Per capita income up one-fourth—By *R. R. Kay.*

◆ EASTERN industrialists, with an eye cocked for things ahead, should expand their thinking to take advantage of the West Coast's unlimited future.

For the Pacific region has a built-in element in its skyrocketing expansion which will breed still more growth in the years ahead.

Going Up! . . . It's the high standard of living that prevails in that part of the country. And it stems from the rapidly rising rate of personal income in the Farwest.

Proof: Personal income in the three Pacific Coast states, increasing by 17 pct in the nine years from 1945 to 1954, was $2090 per capita at the start of last year, according to Dept. of Commerce figures. California's rate of $2162 put it a strong sixth among the forty-eight states.

For the longer period, 1929 to 1954, the West Coast's gain was impressive. Total personal income for the three Farwest states rose by better than 476 pct (from $7.3 billion to $34.8 billion) while the nation's gain as a whole was only 333 pct (going from $85.6 billion to $285.4 billion).

Thus the man anxious to improve his lot in life has a good chance to do so in the Pacific region.

The Basic Force . . . What's the significance of all this? A. W. Zelomek, noted economist and president of International Statistical Bureau, Inc., put it well at a San Francisco conference of Pacific Intermountain Purchasing Agents.

"The man who wants to consume more will work harder to increase his income. Therefore, he'll be more productive. So the West Coast has within its own population a very important motive force for further expansion."

And the economist adds: "Much of the future expansion will be necessary to meet the needs of this very vigorous, ambitious, and rapidly growing West Coast population."

Bethlehem's Plans

"There will be an integrated steel mill in northern California some day," H. H. Fuller, president of Bethlehem Pacific Coast Steel Corp., predicted in an exclusive interview with THE IRON AGE.

But he scotched rumors that his company has plans for blast furnaces at its South San Francisco works. "No room," he said. Besides, he explained, the channel approach to the property is not deep enough for the kind of shipping required to bring in ore.

Mr. Fuller admitted Bethlehem Pacific, along with the other giants in the industry, is always looking everywhere for new sources of ore. Although northern California has known spotty pockets of ore, Mr. Fuller scoffs at the notion that there are any workable quantities in the region.

Asked about his firm's outlook for the rest of this year on the West Coast, he predicted peak operations for the months ahead.

Northwest Needs Steel

Pacific Northwest's cry for steel is louder than ever. Today's consumption is over one million tons per year—up from 625,000 tons in 1949. Some relief is in sight.

U. S. Steel will increase its Columbia-Geneva capacity by 380,000 tons next year. The Pacific Northwest has a promise of a good portion of it.

Plight of the Personnel Men

▪ Despite the fact that every known gimmick, plus a few new ones, are being used to attract engineering and production people to West Coast firms, employment managers in the area can't keep pace with the demand. It's hot as a forest fire.

▪ Convair in San Diego is interviewing at a terrific pace—hiring 200 new employees a week. Company expects to maintain this rate until the end of the year.

▪ Boeing in Seattle wants to employ 1300 at its Everett Naval Shipyard facility. Workers, when located, will be used on B-52 production.



Sun's Heavy Duty Emulsifying Cutting Oil excels on high-alloy aircraft steels

S.E.C.O. Heavy Duty handles all machining jobs requiring an emulsifying cutting oil. Piasecki Helicopter's large job shop at Morton, Pa., found this out three years ago when S.E.C.O. HD* replaced two expensive heavy-duty soluble oils in machining fan hubs.

Extremely versatile and moderately priced, S.E.C.O. HD has been doing an exceptional job in cutting a variety of high-alloy aircraft steels for Piasecki.

For more information about S.E.C.O. HD, see your Sun representative. Or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. IA-10.

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MACHINE TOOL HIGH SPOTS

Services Must Plan Now To Replace Later

Defense Dept. directive instructs Army, Navy, Air Force to detail modernization plan for machine tool replacement . . . Ohio executive reports automation is easier in smaller plants—*By E. J. Egan, Jr.*

◆ IT FINALLY HAPPENED. A new Defense Dept. directive spells out steps the Army, Navy and Air Force must take to insure an "active" replacement program for the military's operating, but obsolete machine tools.

Tough-talking directive from Defense Secretary Charles E. Wilson insists that the armed services establish orderly machine tool replacement programs where such do not already exist. Each service branch must turn in detailed modernization plans by November 21.

Sums necessary to implement these programs will be listed specifically in the next military budget. Plan is to begin buying replacement equipment as soon as the Government's 1958 fiscal year begins, next July 1.

Replace Only . . . Total annual sum to be allocated for this modernization will be 2-5 pct of the acquisition value of the more than 275,000 tools now listed on Defense Dept. inventories. Money will be spent only for equipment to replace tools now in use, not to replace items in departmental reserves or inactive plants.

Whether the program actually goes into effect next July 1 depends on (1) Congressional approval of the replacement item in the next military budget, (2) the chance that appropriated funds might be "reprogrammed" for some use other than replacement.

In Small Packages

Here's a switch. Dr. H. B. Osborne of The Ohio Crankshaft Co. says the big plant isn't always the one where automation is simplest; small or medium plants producing less varied products are sometimes better equipped for automation techniques.

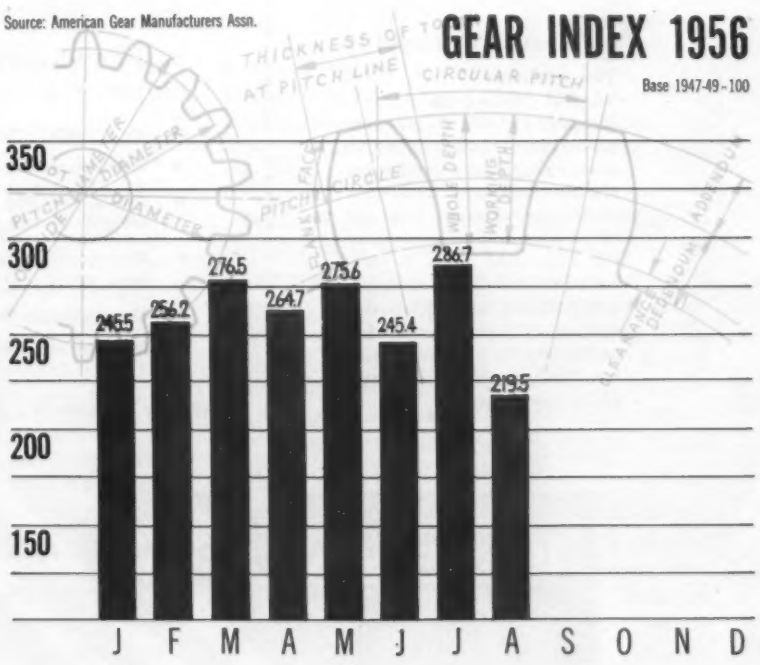
Dr. Osborne's reasoning: Automation begins with simplicity of design, maximum possible allowance for tolerance and surface finish, greatest use of standardized basic parts, and minimum number of production steps. He expressed his views at a recent in-plant automation course conducted by International Harvester for 280 of its engineers and heads of production departments.

Features . . . The two-day course featured more than 40 working exhibits of automated metalworking equipment, included an intensive series of lectures, slide films and movies. Object was to show what is needed and what should be avoided in developing automated setups.

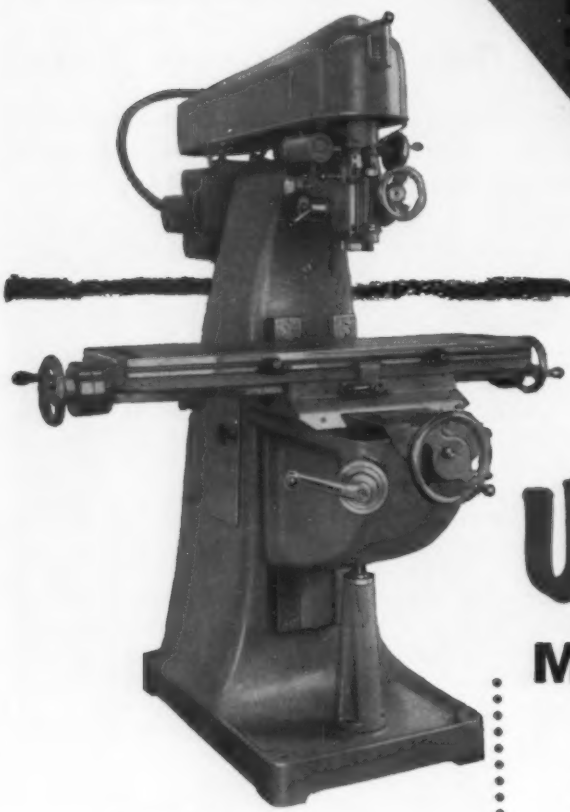
H. E. Nason of Westinghouse Electric Corp. pointed out that even the job shop can move to more automatic production with new and versatile equipment for gaging, handling and machining workpieces. He demonstrated a one-man gear carburizing line to prove his point.

Possibilities for automatic assembly were demonstrated on equipment which assembled circuit breaker arms.

Source: American Gear Manufacturers Assn.



Choice of hand or
power feed head and table



BALANCED RIGIDITY

assures
*CERTIFIED
ACCURACY

in the NEW

U.S.Vertical
MILLING MACHINE

Tested 10 Ways!

The accuracy of each U. S. Vertical Milling Machine is certified. A check sheet accompanies every machine listing 10 exacting operational tests the machine has passed. The check shows allowable tolerances and actual measured tolerances of the individual unit. A new bulletin provides complete specifications and illustrates various accessories available on the new U. S. Vertical Milling Machine. Write for your *FREE* copy today.

Balanced rigidity, the key to accuracy for vertical and angular milling operations, is an integral part of the new U. S. Vertical Milling Machine.

These U. S. Vertical features provide rigidity for close tolerance work:

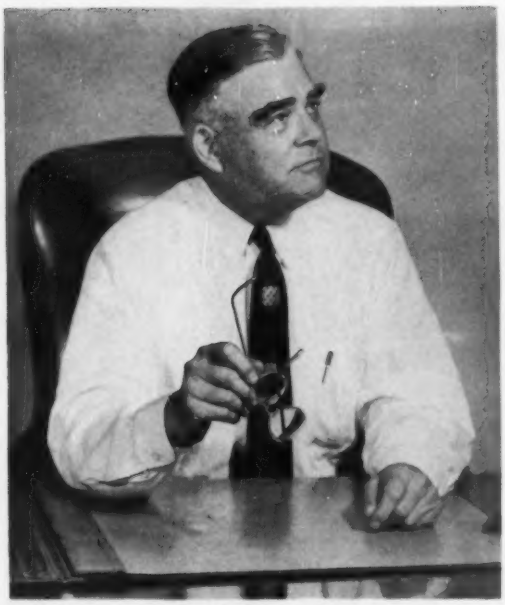
- Machine weighs 2000 pounds
- Extra wide bearing surfaces
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Drive by B section V belt

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Manufacturers of:
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The Iron Age SALUTES

Ralph L. Gray President of Armco Steel Co., he showed the industry how steel could be produced profitably in the West. He was raised on a Missouri farm; paid his way through college by working harvests and teaching.

Long after the last pioneer had settled, Ralph L. Gray helped open a new frontier in the West —steelmaking.

As head of Sheffield Steel since 1931, he resurrected the ore mining industry of East Texas which was dead since the Civil War, built a giant steel mill at Houston, brought in coal from Oklahoma, gathered other raw materials and scrap from the Midwestern countryside, and turned out high grade steel products at a profit. For more than 20 years he was making steel in a section of the country long regarded as a bad bet by the industry generally.

Sheffield has since become a division of Armco Steel Corp. This year, Mr. Gray was elected president of Armco, the nation's eighth largest steel producer.

Born Dec. 8, 1894, the ninth of ten children, he grew up on his father's farm near St. Charles, Mo. At 11, he wanted to become an electrical engineer, a goal which he accomplished. He helped finance his education by raising a sweet potato crop each year on his Dad's farm and by working the harvest on neighboring farms. At Washington University of St. Louis, he supported himself by teaching math courses at night.

While working as chief engineer for Laclede Steel Co. after World War I, he first showed his pioneering spirit; tried to interest an uncle into financing a mill to make reinforcing bars from old rails. When his uncle didn't warm up to the idea, Mr. Gray cast his lot with a company which was creating excitement in the industry by producing new steel entirely from scrap—the Kansas City Bolt & Nut Co. It later changed its name to Sheffield Steel Corp.

Mr. Gray can look back on the past with a deep sense of accomplishment, but his eyes are focused on the future. "Any company that hopes to get anywhere must grow with the country," he says. "There is no limit to market frontiers."



"Time is of the Essence..."

and BRISTOL BRASS IS OF THE ESSENCE OF TIME

Last century, when weather-witched wooden clockworks made timepieces too unreliable and expensive for most people, the old Bristol Brass and Clock Company came up with weather-proof brass clockworks that gave everybody the right time at the right price.

And that's been going on ever since. Now, as then, good solid Bristol Brass is the built-in guarantee of accuracy and long life in the most famous makes of clocks, watches, timers and instruments made in the world today. And these makers know they can "set their watches" by Bristol Brass quality and service . . . by unvarying physical and dimensional uniformity of Bristol Brass strip, rod and wire . . . and by stop-watch punctuality of delivery. In fact, Bristol Brass deliveries often "beat the clock" . . . because here the processing of orders is not bound up in red tape. Try setting *your* watch by Bristol Brass. You'll never lose time . . . *or anything else!*

. . . and for BRASS FORGINGS, too . . . get them from **ACCURATE BRASS CORP.** (*Subsidiary of The Bristol Brass Corporation*) now in a new and modern plant at Bristol, Connecticut

THE BRISTOL BRASS CORPORATION

has been making Brass strip, rod and wire here in Bristol, Connecticut since 1850, and has offices and warehouses in Albany, Boston, Buffalo, Chicago, Cleveland, Detroit, Milwaukee, New York, Philadelphia, Providence, Rochester, Syracuse. The Bristol Brass Corporation of Ohio, 1607 Broadway, Dayton.

"Bristol-Fashion" means **Brass at its Best**

The Iron Age INTRODUCES

Eric F. West, elected president, **Aluminum Limited Sales, Inc.,** New York; **W. Theodore Stewart,** named treasurer.

William R. Bascom, elected vice president, **Granite City Steel Co.,** Granite City, Ill.

Following appointments are with **Gear Grinding Machine Co.,** Detroit, and its subsidiaries. **William F. Wilson,** elected executive vice president, **Gear Grinding; William J. Taylor,** elected vice president and general manager, **Republic Gear Co.; Fred F. Miller,** elected vice president, **Detroit Bevel Gear Co.**

R. S. Gruver, named administrative vice president, Armco Div., **Armco Steel Corp.,** Middletown, O.; **L. H. Juengling,** elected vice president, Sheffield Div.; **F. H. Fanning,** elected vice president, planning and development; **L. F. Reinartz,** elected vice president, special operating development; **C. G. Davies,** named asst. vice president.

Thomas A. Carr, named supervisor, metallurgy and quality control, Spring Div., **Crucible Steel Co. of America,** Pittsburgh.

William R. McCalister, named general superintendent, National Tube's Ellwood Works, **U. S. Steel Corp.**

John A. Thornton, named secretary and treasurer, **Kennecott Wire and Cable Co.,** subsidiary of Kennecott Copper Corp.; **Lewis H. Bethel,** named asst. secretary and asst. treasurer.

Donald Weiss, named district sales manager, Ohio and Kentucky, **Verson Allsteel Press Sales Co.,** Hamilton, O.

C. P. Clapp, named manager, manufacturing, Refractories Div., **The Carborundum Co.,** Perth Amboy, N. J.; **H. M. Killmar,** named plant manager; **Jack S. Gaynor,** named manager, manufacturing engineering.

George H. McClure, named asst. manager, central sales, **Armco Steel Corp.,** Middletown, O.

Lewis T. Gibbs, named manager, High Strength Steel Sales Div., **U. S. Steel Corp.,** Pittsburgh; **Stanley C. Lore,** named asst. manager.

Walter Nollenberger, named manager, manufacturing plant, **Square D. Co.,** Lexington, Ky.; **Stephen Kovach,** named manager, smaller regional assembly plant, Atlanta, Ga.

Burton V. Coplan, named silicon project supervisor, Chemical Development Dept., **General Electric Co., Pittsfield, Mass.**



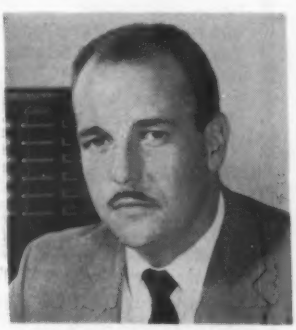
ALBERT S. BURGOYNE, elected vice president, manufacturing, E. W. Bliss Co., Canton, O.



J. D. REYNOLDS, elected vice president, Reynolds Metals Co., Richmond, Va.



MORD LEWIS, elected vice president, Anaconda Aluminum Co., New York.



PAUL K. DUBIN, named general works manager, Ulbrich Stainless Steels, Inc., Wallingford, Conn.

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William C. McCosh, appointed manager, railroad and industrial brush sales, **National Carbon Co.,** Div. of Union Carbide and Carbon Corp., New York; **J. W. Scales,** named manager, Mid-eastern Div., Carbon Products Sales Dept., Pittsburgh office; **R. L. Westlake,** named manager, Central Div., Carbon Products Sales Dept., Chicago; **A. W. Wolff,** named manager, carbon specialty sales, Cleveland.

Howard G. Vilsoet, appointed district sales manager, Louisiana, Arkansas, and Southern Mississippi, Berger Div. products, **Republic Steel Corp.,** Baton Rouge, La.

W. Arthur Gneiser, named manager, **Leeds & Northrup Co.,** Denver.

Calvin E. Bamford, named asst. manager, aluminum sales, **Kor-humel Steel & Aluminum Co.,** Evanston, Ill.

Frank L. Kelsy, appointed manager, **Niagara Machine and Tool Works,** Indianapolis, Ind.

Edwin J. Blanning, named asst. to general superintendent, cost improvement, Gary Steel Works, **U. S. Steel Corp.**

George B. Howell, named manager, sales, tubular products and cold finished steel bars, **Joseph T. Ryerson & Son, Inc.,** Detroit.

E. W. McGovern, named asst. technical director, carbide operations, **Electro Metallurgical Co.,** Div. of Union Carbide and Carbon Corp., Niagara Falls, N. Y.; **W. S. Sherk,** named asst. technical director, operations; **B. J. Haley,** named asst. plant manager, Ashtabula; **C. C. Whiting,** appointed plant metallurgist, Electromet's Alloy, W. Va., plant.

Earle C. Smith, appointed director, research, **Republic Steel Corp.** He will continue as chief metallurgist of the company.



ALBERT M. NORMAN, elected treasurer, Crown Cork and Seal Co., Inc.



WILLIAM C. MULLIN, named sales manager, instrument gages, Gage Div., Pratt & Whitney Co., Inc., West Hartford, Conn.



RICHARD A. WOLSCHLAG, named Eastern regional sales manager, Brainard Steel Div., Sharon Steel Corp., New York.



CHARLES G. CHISHOLM, appointed general sales manager, Haynes Stellite Co., Div. of Union Carbide and Carbon Corp.

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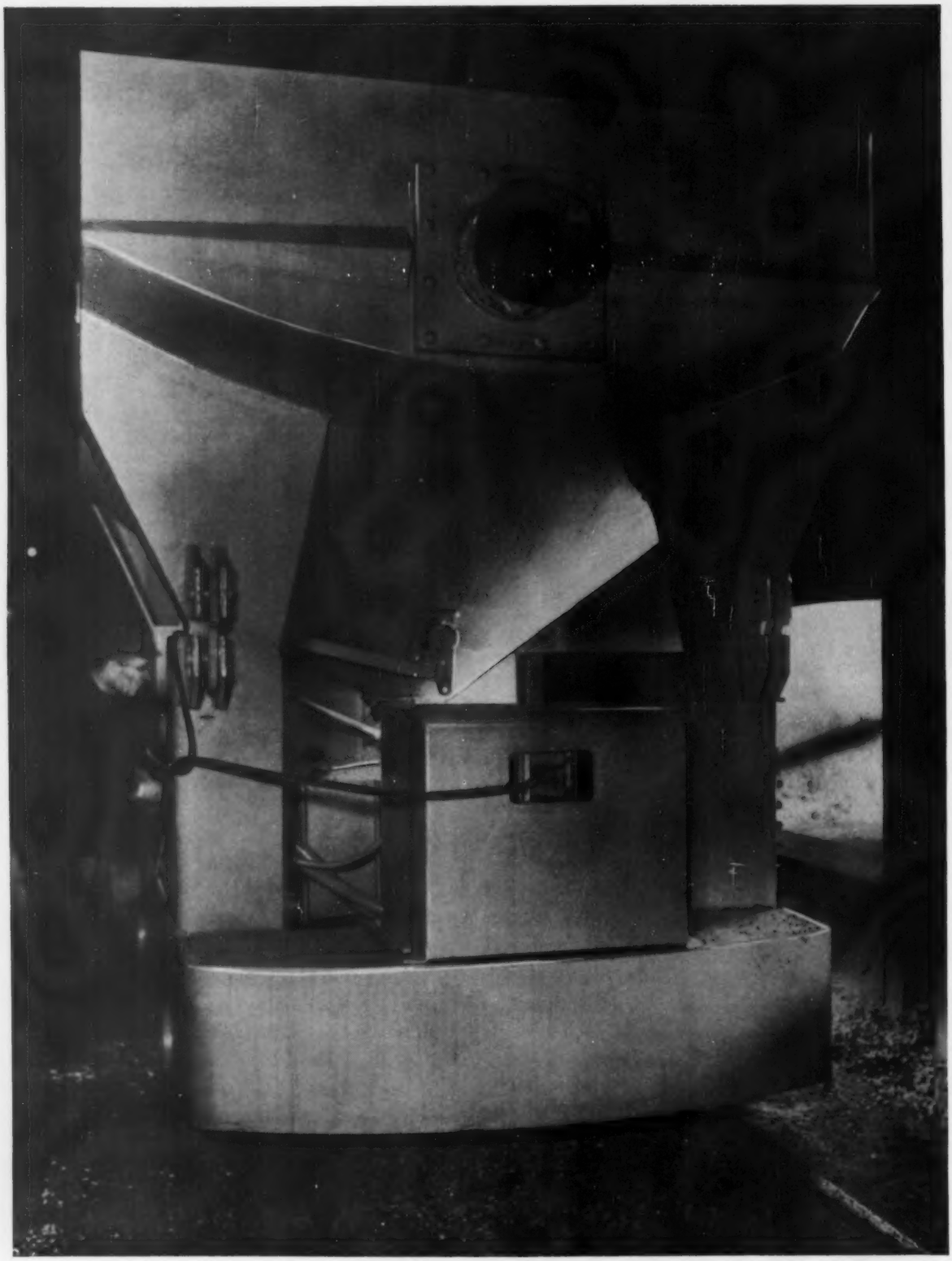
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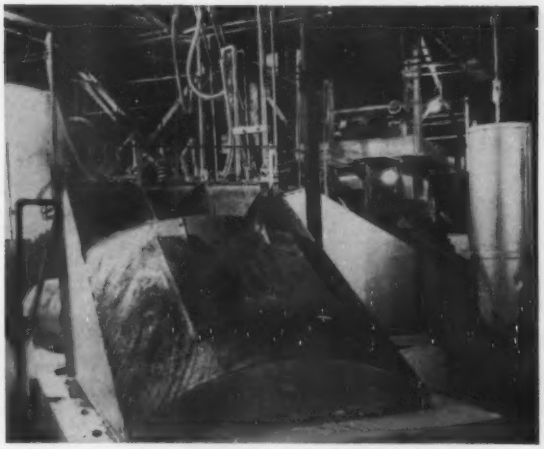
DOLOMITE MACHINE—Custom designed to meet individual operating conditions. Crane handled, car driven or self-driven. 100 to 450 cubic feet capacity. Hydraulic throwing mechanism gives vertical direction to Dolomite stream. Lateral direction is achieved by means of roller assemblies in the lower support.

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for safe, mechanized

steel making

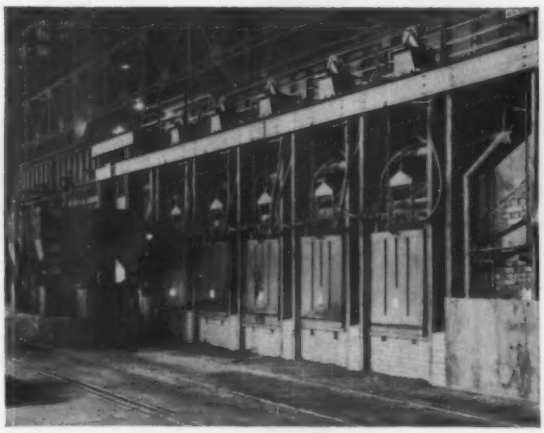


REVERSING VALVES—Blaw-Knox reversing valves for all types of high temperature furnaces change direction of fuel flow effectively, positively in a matter of seconds. Furnace efficiency is increased, fuel consumption correspondingly decreased, and down-time for valve maintenance is reduced.

Blaw-Knox steel plant accessories are designed, engineered and fabricated to meet the rugged operating conditions of all phases of steel making. From Water Cooled Doors to Manganese Feeders, Blaw-Knox equipment provides better, mechanized service tailored to individual operating conditions.

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PERSONNEL

Homer S. Peck, Jr., named employment manager, Salem Plant, Lock and Hardware Div., **Yale & Towne Manufacturing Co.**, Salem, Va.

Welling W. Adams, appointed Western regional sales manager, **Rigidized Metals Corp.**, Los Angeles.

Charles B. Seelig, named manager, marketing, Small Steam Turbine Dept., **General Electric Co.**, Fitchburg, Mass.

R. F. Knobloch, appointed midwestern belting sales engineer, Conveyor and Elevator Belting Dept., **United States Rubber Co.**, Chicago.

Jack W. Qualman, named asst. chief engineer, Detroit Transmission Div., **General Motors Corp.**, Ypsilanti, Mich.

George V. Robertson, Jr., named chief engineer, **The Belmont Iron Works**, Philadelphia.

Following appointments are within the Metallurgical Dept. of **Crucible Steel Co. of America's** Midland, Pa., Works. **Paul R. Brucker**, named division metallurgist, flat rolled products; **Michael Zetz**, appointed division metallurgist, melting and bar products.

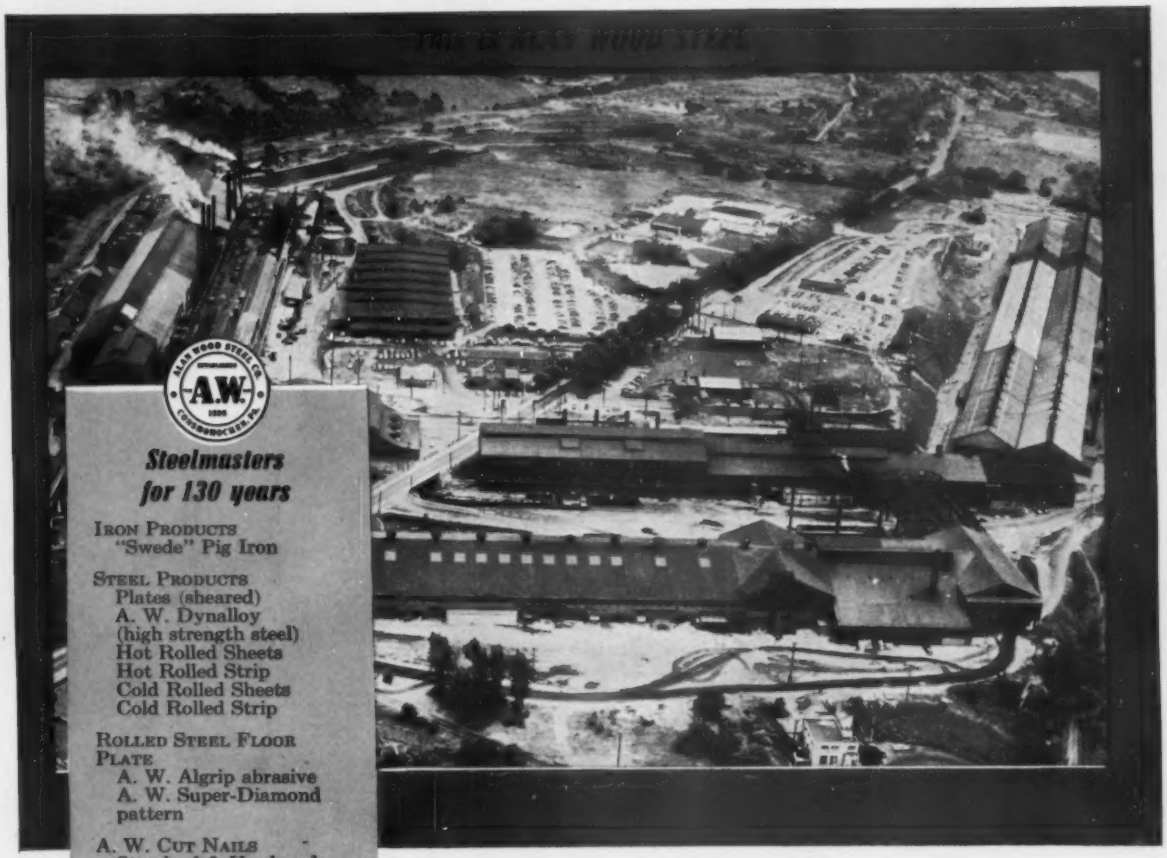
OBITUARIES

Donald B. Gillies, 83, retired vice president, **Republic Steel Corp.**, Cleveland.

Joseph M. Schaeffer, 71, president, **The Waterbury Farrel Foundry & Machine Co.**, Waterbury, Conn.

George H. Hanlon, 68, president, **Western Fire Brick Co.**, Granite City, Ill.

Robert B. Pogue, 67, consulting engineer and former vice president, engineering, Brake Shoe & Castings Div., **American Brake Shoe Co.**, New York.



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Standard & Hardened

MINE PRODUCTS
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Iron Powder
Crushed Stone
Grit
Sand & Engine Sand

COKE
Foundry, Industrial & Metallurgical

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Benzol
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PENCO METAL PRODUCTS DIVISION
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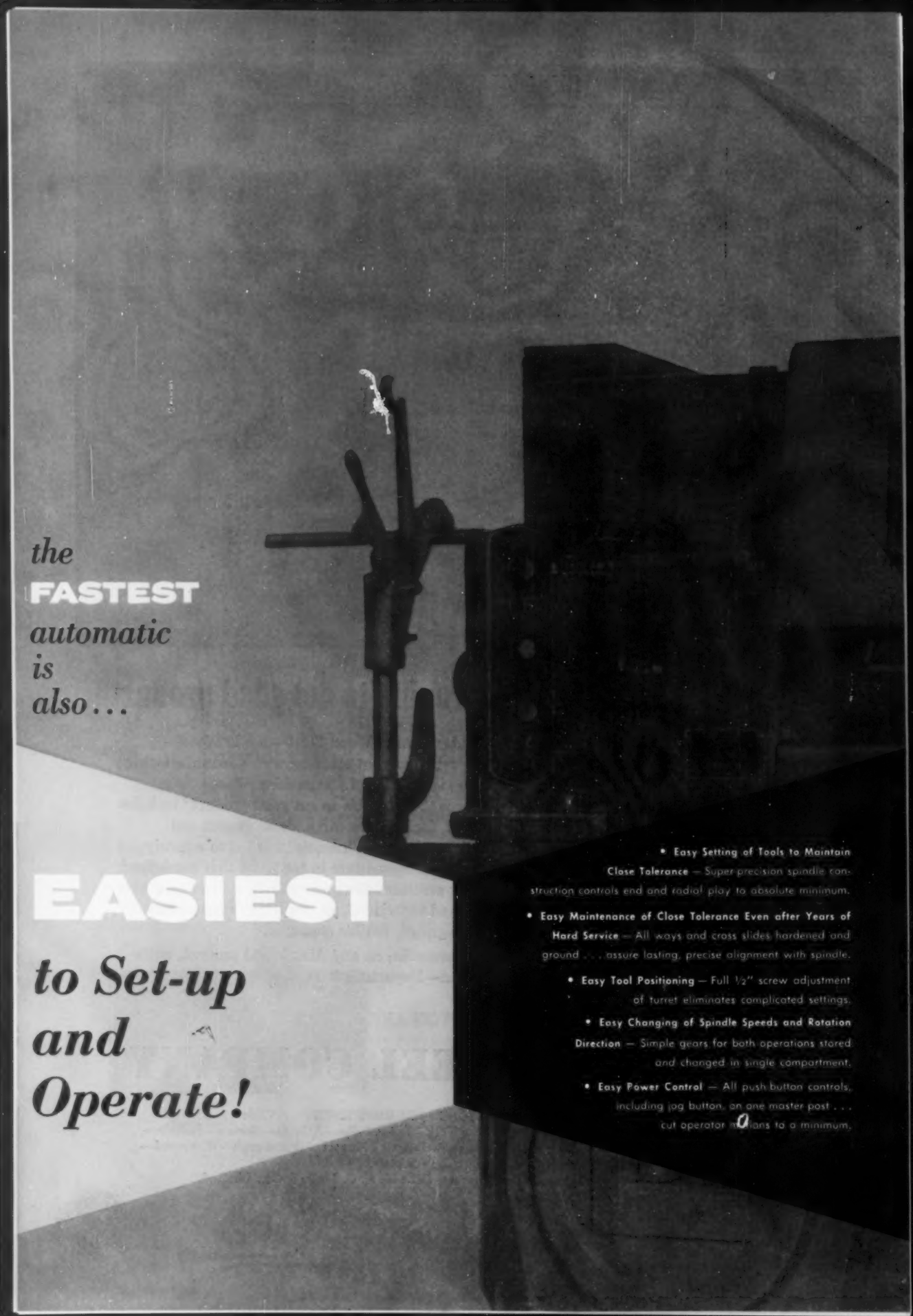
For detailed information on any Alan Wood product, write Marketing Division—Department AW-47.

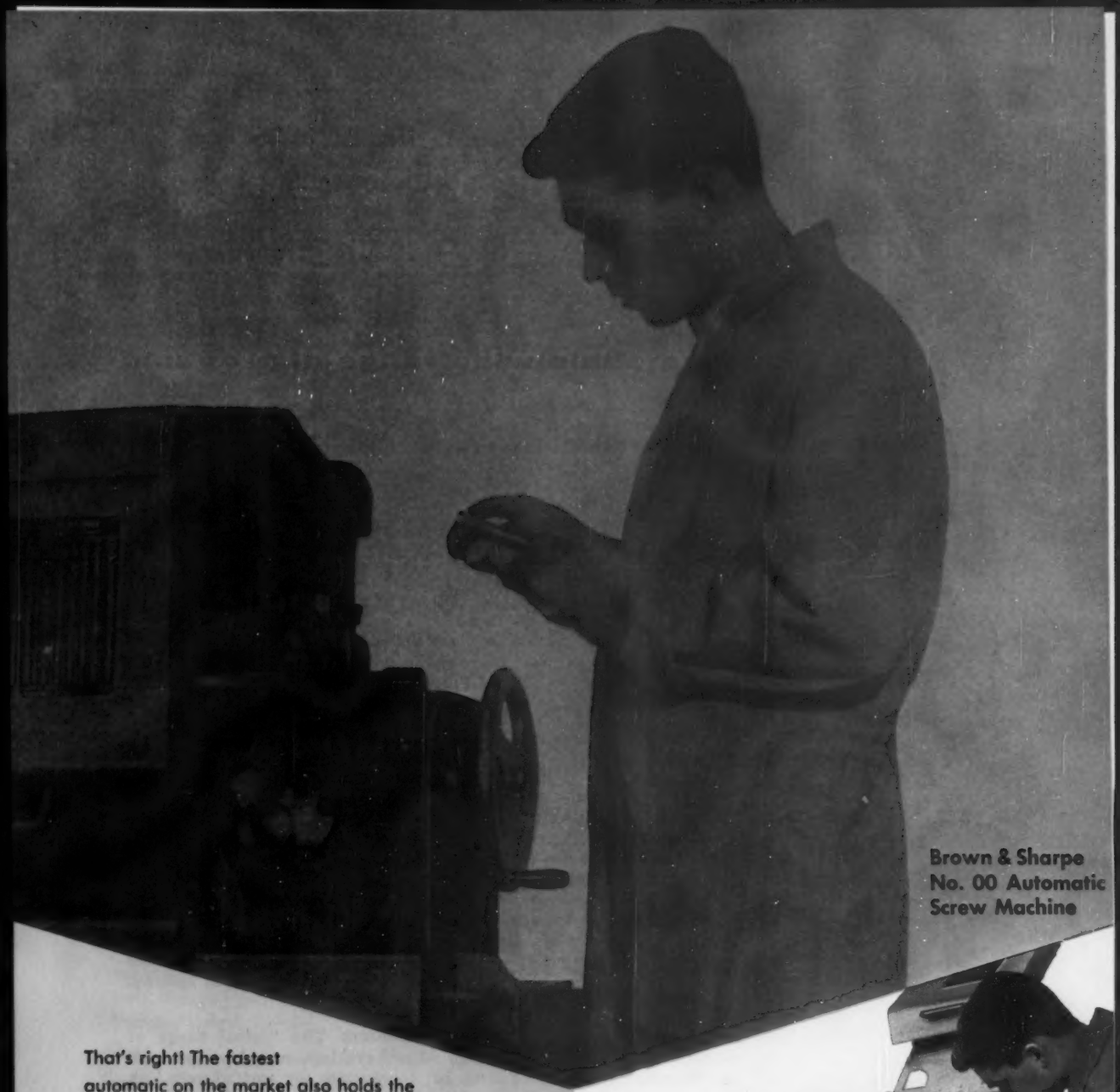
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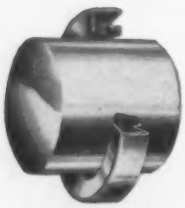


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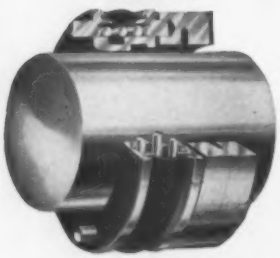
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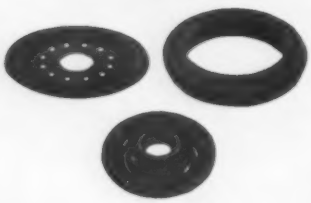


SHAFT-TYPE OIL SEALS More than 20 types, forming over 7,500 size combinations for shafts from ¼" to 50" O.D., are available — thousands from stock. These seals are used for the vast majority of shaft sealing problems from simplest dust exclusion to high-speed, high-temperature fluid retention and foreign matter exclusion under extremely rugged operation where high sealing efficiency must be maintained over long service life.



END FACE SEALS For critical sealing problems outside the capabilities of shaft-type seals, there are C/R End Face Seals, which operate on the principle that two smooth, flat surfaces, one rotating on the other at right angles to the shaft, form a leakproof seal. They require minimum pressure to maintain face contact, create minimum friction, heat and power loss, and give unsurpassed performance under the most severe conditions.

Typical applications of C/R End Face Seals include: sealing track rollers of crawler tractors; sealing high-speed accessory drives in aircraft; sealing medium speed applications such as gear cases of washing machines, dishwashers and similar home appliances.



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SIRVIS-CONPOR MECHANICAL LEATHER PRODUCTS The typical range of mechanical leather products includes oil seal packings, cups, boots, washers, gaskets, couplings and valve discs, but encompasses any part wherein high tensile strength, flexibility, high resistance to pressure, wear, shock, and vibration are desired. Cups of C/R's Conpor impregnated Sirvis leather products are operating at pressures up to 10,000 p.s.i. They are insoluble in most hydraulic oils and compatible with a wide range of other oils, solvents and gases. C/R boots of Sirvis leather, canvas, nylon or elastomer impregnated fabric can be produced in sizes two stories high or not bigger than your thumb for use in the protection of eccentric, universal or reciprocating action. Whatever your sealing or protection problem, bring it to Chicago Rawhide. C/R Engineers are constantly developing new mechanical leather designs for special and universal application.

Please write direct or contact your nearest C/R sales engineer about your problem in fluid sealing or related fields.

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CHICAGO RAWHIDE



FEATURE ARTICLES

For safety's sake—

How to Install FIRE-Resistant Hydraulic Fluids

By E. J. EGAN, JR., Machinery Editor

◆ Switching from a flammable, petroleum-base hydraulic fluid to one of the fire-resistant types is not especially difficult . . . But it does require a bit more than just draining "most" of the former fluid from the system.

◆ There are recommended installation and maintenance procedures for each of the three basic fire-resistant fluid types . . . Careful attention to these specific do's and don'ts will insure best results from the changeover.

◆ YOU COURT DISASTER if you permit the use of petroleum base oils in hydraulic equipment operating near a source of high heat. When a high-pressure oil line or fitting bursts or springs a pinpoint leak, the escaping oil stream can instantly become a highly flammable air-oil mist. If this spray hits an open flame, a pot of high temperature metal, or anything hot enough to ignite it, the result can be disastrous.

Best way to eliminate this hazard is to substitute a fire-resistant hydraulic fluid for conventional petroleum oils. When properly chosen, installed and maintained, such a fluid will give excellent service, even in pumps and systems originally designed for oil flow.

There are three basic types of fluids which, for all practical purposes, can be considered fire-resistant. One is a water-glycol combination containing a thickener plus certain additives. Second type is a non-aqueous synthetic fluid, most generally a phosphate ester. Third variety is a combination of water, emulsifying agents and petroleum oil; a so-called water-soluble oil emulsion.

All three forms are available commercially in a variety of formulations and trade names. Thus the prospective buyer has considerable latitude in choosing one that will (a) keep a particular hydraulic unit operating efficiently, (b) eliminate the fire hazard.

Replacing a petroleum oil with a fire-resistant fluid is not especially difficult. But it does involve more than just draining "most" of the former oil out of the system. After all, the switch is being made to a carefully compounded

■ Cooperation of the following organizations in supplying information for this article is gratefully acknowledged: E. F. Houghton & Co., Monsanto Chemical Co., National Fire Protection Assn., Shell Oil Co., Socony Mobil Oil Co., Inc.



PRESSURE-sprayed into torch flame, fire-resistant hydraulic fluid fails to ignite (left). Conventional petroleum-base fluid burns intensely (right) under same test conditions.

and balanced fluid of an altogether different nature; anything else that gets in is a contaminant. Therefore, recommended change-over precautions and procedures should be followed faithfully.

If a water-glycol mixture is to be installed, the hydraulic system must be completely drained and cleaned of whatever fluid was used previously. This applies to the reservoir, accumulator, coolers, valves, cylinders and all lines. Where low spots make draining difficult, connecting joints should be taken apart, drained and cleaned individually. Hand wiping all parts with lint-free rags is recommended.

Insure good intake

Filters and intake-pipe strainers should also be removed and cleaned thoroughly. And since fuller's earth filters remove certain additives from the fluid, cartridge type filters should be used. To insure good fluid intake, screen mesh of intake strainers should be 60 or less. Screens made of brass, or plated with copper or nickel, are compatible with these water-glycol fluids; cadmium or zinc coated strainers are not.

Conventional oil-resistant paint inside the fluid reservoir must be removed or it will be attacked by the water-base fluids. Special paint formulas are available if repainting is desired or necessary. Similarly, new pipe joint compounds will probably be needed.

As for hydraulic packings and seals, the water-glycol fluid does not affect either synthetic rubber, leather or a combination of the two. However, rubber-impregnated cork seals used with shaft bearings may swell from water absorption, and should be replaced with mechanical seals of synthetic rubber. Also, where shaft bearings were formerly lubricated with sodium-soap grease, a switch to a water-resistant calcium, lithium or aluminum-soap type is recommended.

Use of a water-base fluid requires no change in accumulators or hydraulic hoses. All commonly used types are compatible with these liquids.

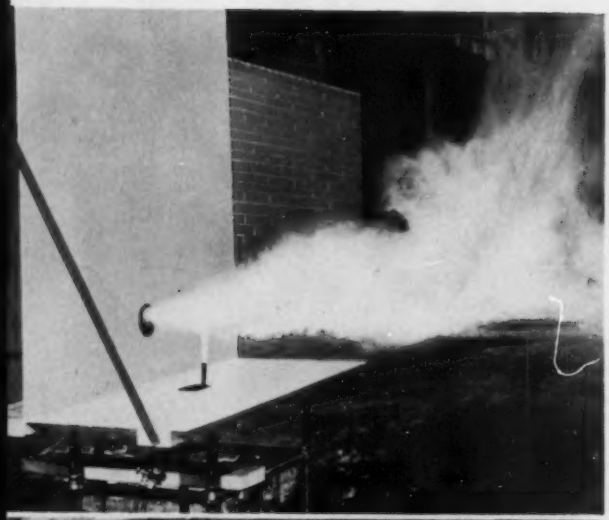
When all of the foregoing checkpoints have been attended to, hydraulic components can be reconnected and the system (including accumulator) filled with the fire-resistant fluid. After cycling the machine for 10 minutes, the reservoir level should be inspected and brought up full, if necessary. At the same time, all leaky piping and joints should be re-tightened.

Proper maintenance of water-glycol fluid requires that its operating temperature be kept below 150°F. Above this point, water in the fluid evaporates too rapidly, thickening the mixture and unbalancing it. Heat exchangers may be needed to hold temperatures at optimum levels. In any event, some water may have to be added to the system from time to time. Only distilled or deionized water should be used. Producers of these synthetic fluids will supply full information regarding periodic tests for water makeup and correct pH.

A little is too much

In switching a hydraulic system over to a non-aqueous, straight synthetic fluid, extra care must be taken to purge it of all traces of petroleum oil. Such oil is soluble in the phosphate ester material, and one per cent or more of it in solution could impair fire-resistant properties.

Low pressure air can be helpful in getting the last drop of oil out of remote parts of the system. The reservoir, especially, should be wiped clean and dry. In intricate hydraulic units, a quantity of the fire-resistant fluid can be used as a flush-





FIRE-RESISTANT fluid sprayed 1200°F die-casting machine pot, but didn't burn, when this line burst.

ing medium. Circulating it for several hours will make it hot enough to do a better cleaning job, which should include complete removal of paint from the reservoir. This fluid can then be reused for flushing other equipment before a changeover is made.

Phosphate ester fluids, in contrast to water-base types, do have a deleterious effect on hydraulic packings and seals normally used with petroleum oils. This applies to those units of the neoprene rubber or Buna N type. They should be replaced with seals of butyl rubber or Thiokol-impregnated leather. Butyl rubber accumulators and flexible hoses are also recommended for use with phosphate ester fluids.

When the purging and re-sealing job is complete the hydraulic unit can be reassembled. As with the water-base fluid, special pipe joint compounds will again be needed.

Once the phosphate fluid is in the system, little additional maintenance is necessary. However, after the first few days of operation, a checkup for oil or water contamination and for dislodged deposit accumulations on filters and screens is a wise precaution. Contaminating oil

Typical Uses for Fire-Resistant Fluids

Diecasting machines	Combustion regulators
Permanent mold machines	Ladle tilters
Press welders	Forging presses
Lift trucks	Extrusion presses
Scrap balers	Coil unloaders
Rolling mills	Shears and scarfers
Coke pushers	Dolomite machines
Furnace chargers	Hoists and elevators
Ingot manipulators	Coupling tighteners

can be removed from these fluids by settling or centrifuging, provided the two fluids have not become homogenized. Any water that is present will remain on the surface of the phosphate fluid and can be skimmed off. Dirty or clogged filters and strainers must be removed and cleaned, of course.

Changeover of a hydraulic system to a water-soluble oil emulsion requires the same thorough cleanup and flushing as the other two fire-resistant fluid types. Packings and seals used with the former petroleum oil may not have to be changed, however.

Flushing should be done only with a quantity of the emulsion itself; use of solvents or chemical cleaners may leave traces that would upset the stability of the fluid and possibly lower its fire-resistant properties. Next step is a refill with fresh fluid.

Check water content

After the emulsion has been in full use for a short period, filters and screens should be removed and cleaned. There is always a tendency for the warm fluid to dislodge sludges and deposits which were not completely removed at changeover time.

Maintenance of these water-oil emulsions also requires periodic checks to note any increase or decrease in water content. Too much water (from condensation or other sources) may necessitate replacing the fluid altogether. Water evaporation should be compensated for by make-up additions which bring the emulsion back to optimum balance and effectiveness.

Emulsion instability may also result from contamination by other fluids, or from periods of severe usage, and may require all new fluid.

Reprints of this article are available as long as the supply lasts. You may obtain a copy from Reader Service Dept., THE IRON AGE, *Chestnut & 56th Sts., Philadelphia 39, Pa.*



AISE Stresses Practical Pointers

◆ New products, new processes and new ideas had one thing in common at the recent AISE Show in Cleveland . . . Each stressed the present practical aspects of an expanding steel industry . . . No elaborate claims were made for the future.

◆ EVERY crowded aisle of Cleveland's Public Auditorium brought new cost-saving ideas and products to the thousands of members and visitors at the recent AISE Exposition. Held in conjunction with the convention and technical sessions, the entire program had much to offer to those in an expanding steel industry.

Heading the activities of the AISE during the coming year will be J. D. O'Roark, Assistant Manager, Dept. of Service and Maintenance, Weirton Steel Co., who replaces W. H. Collison as President. Others elected to executive offices were: L. Larson, Chief Engineer, Republic Steel Corp., First Vice President; E. Kern, Vice President of Engineering, Allegheny Ludlum Steel Corp., Second Vice President; S. C. Read, Director of Construction and Maintenance, Jones & Laughlin Steel Corp., Treasurer; and C. E. Pritchard, Supt. of Mills, Alan Wood Steel Co., Secretary.

As always, the exposition featured many products shown for the first time. Some, in fact, were brought out from under wraps at the show but will not be in production until late this year or early next year. One such item is a liquid oxygen cylinder which holds the equivalent of more than 12 cylinders of gaseous oxygen. Lubricants, material handling equipment, electronic devices, marking equipment, metering devices and many other items answered the query, "What's new?"

Emphasis on today's problems

The kind of information steel men need and can use now, set the pattern for the technical sessions. With few exceptions, there were no fancy trimmings or elaborate claims for the future. Emphasis was directed toward current steel operating problems.

Scarfing is just such a problem. W. M. Bloom of Allegheny Ludlum Steel Corp. evaluated the various gases normally used for scarfing in terms of their cost and overall efficiency.

Underlining the importance of the subject, Mr. Bloom noted that "aside from the special alloy



steel groups, scarfing has become the major method of steel defect removal." It is done "at hot rolling temperatures by an in-line scarfing machine ahead or after the rolling mill or by use of the hand scarfing torch on hot or cold metal".

Frequently the efficiency of a scarfing operation boils down to the relative efficiencies of acetylene and natural gas. To resolve this problem on a carbon mill, according to the author, involves the following question: "Does the overall economics of the particular scarfing process indicate the use of acetylene?

"If a few cents additional cost per ton for acetylene over natural gas is not offset by some other factor, be it wages, maintenance, production, quality, depth of cut, operator fatigue, burner design, etc., then the use of natural gas can be justified."

Edge position control discussed

Edge position control for steel strip makers was the subject of a paper presented by F. J. Markey of Askania Regulator Co. He pointed to the fact that edge position control is applied to continuous process lines in many forms.

The bulk of the discussion, however, was devoted primarily to edge control on pay-off and winding reels. The author also presented an edge position control system for accurate guiding of strip at intermediate points within the process.

The costs of mechanical cleaning operations in steel plants were reviewed by G. D. Dill of Wheelabrator Corp. Basic costs were provided for such everyday operations as conditioning ingot molds, descaling slabs and billets for inspection, strip and sheet cleaning, and blast etching of mill rolls. Each item covered was related to a key installation and the relative advantages of each were underlined.

Tuyere air proportioning for blast furnace operations assumes that uniform blast is an important factor in getting optimum results, according to E. K. Miller, Jr. of Gary Steel Wks., U. S. Steel Corp. He disclosed that preliminary tests proved that the typical blast furnace does not receive its wind uniformly from its tuyeres.

Air proportioning found practicable

Tests run on an experimental installation at Gary Wks. prove that air proportioning is not only possible but highly practicable. Some of the tangible benefits of air proportioning such as increased lining life and maintenance of high production rate are now being realized.

The influence of the scrap situation upon the future of the electric furnace was emphasized by W. B. Wallis of Lectromelt Furnace Co. The future of the electric furnace tonnagewise is limited, he said, as long as large furnaces are totally dependent upon a scrap charge.

Quality of scrap is also a significant factor, and contaminated scrap is becoming more and more commonplace. Despite these factors, the picture is brightened considerably by alternate sources of charge material.

Among the more important alternatives, Mr. Wallis listed hot metal's expanding use, hydrogen-reduced ore, desiliconized hot metal, and production of electric furnace pig iron in new designs which lower consumption of power.



Halve milling time—

Get Faster Machining From Magnesium Parts

◆ When you have a choice of materials in machining a part, consider magnesium . . . Reports on its top machinability continue to roll in, not only on turning, but also on drilling and milling operations.

◆ Reduced machining time can frequently more than offset the comparably high cost of magnesium per pound . . . In one case, time saving halved total machining costs . . . Even in mass production, magnesium can mean more shop profit for you.

By HAROLD SCHERTEL, Development Engineer, Magnesium Technical Service and Development Dept., The Dow Chemical Co., Midland, Mich.

◆ MACHINING speed can be measured in dollars as well as rpm. Consider a machined part where several materials will meet service requirements. It does no good to pick low cost stock, if it takes four times longer to machine than another material priced higher.

All this is only common sense. But to some machine shops it comes hard to pay 70 cents a pound for stock, when the same part can be turned from mild steel at 6½ cents per pound. Yet cases exist where the higher priced metal has saved money, in terms of total production cost.

TABLE I Recommended Drilling Speeds and Feeds

Metal	Speed, fpm	Infeed, ipr
magnesium	300–2000	0.004–0.030
aluminum	300–550	0.004–0.016
zinc	100–300	0.002–0.010
mild steel	25–70	0.002–0.010
cast iron	10–70	0.002–0.010

For many years, magnesium found its major applications where need for light weight overshadowed other considerations. Today, when the metal is chosen, it's more and more often because of its machinability.

In some case studies, magnesium has topped aluminum, zinc, steel and cast iron both in ability to be machined and in speeds practical for the machining operation. It's been known to extend tool life as much as 1000 pct. Cycling times can be far less than with other metals. In over-all machining costs, savings up to 50 pct have been demonstrated.

One Chicago machine shop found it possible to reduce costs on one part from $5 to $2.75 each. In producing 12-in. diam pulleys from cast iron, two turning operations were followed

TABLE II **Recommended Lathe Speeds and Feeds**

Metal	Speed, sfpm	Infeed, ipr	Maximum depth of cut, in.
magnesium	1000+	0.005–0.100	0.50
aluminum	600–1000	0.005–0.030	0.25
zinc	250–600	0.005–0.060	0.25
mild steel	50–200	0.005–0.080	0.25
cast iron	50–120	0.005–0.080	0.25

TABLE III **Recommended Milling Speeds and Feeds**

Metal	Speed, sfpm	Feed, ipm	Maximum depth of cut, in.
magnesium	1000+	10–100	0.50
aluminum	400–800	3–40	0.25
inc	250–400	2–30	0.062+
mild steel	40–100	1–2	0.25
cast iron	50–100	0.5–2	0.25

Case Study: Machining 12-in. Diam Pulley

Operation	Time, minutes Cast Iron	Magnesinm
turning, rough	46	15
turning, finish	10	4
boring	8	5
balancing	5	none
total	69	24

Case Study: Screw Machine Production of Venetian Blind Mechanism—total run: 200,000 pieces

	Steel	Magnesium
weight, 1000 parts, lb	6.15	1.41
weight, total lb (200,000 parts)	1230	282
machine speed, rpm	2150	6000
cycle time per part, seconds	2	1
machine costs, per part	$0.00225	$0.0008
machine costs, total (200,000 parts)	$450.00	$164.00
material costs	$80.00	$197.00
comparative costs*	$530.00	$361.00

* Other cost factors remain identical in both cases, hence are ignored for comparison purposes.

by boring and balancing. Total machining and balancing time for each pulley averaged 69 minutes.

At $5 per hour shop rates, the firm found it could halve total machining costs per pulley by switching from cast iron to magnesium. The accompanying case study lists the details. Since the magnesium pulley weighs only 8 lb, it needs no balancing. The cast iron pulley weighed 32 lb.

Like many job shops, this firm previously was plagued with space problems. Tests showed that one lathe turning magnesium could do the work of three lathes cutting cast iron. This has the effect, says the metalworker, of cutting space requirements as well as machine tool investment.

An Indiana machine shop has reported appreciable savings on a mass production operation. It converted from steel to magnesium in the screw machine manufacture of venetian blind adjusting mechanisms. Total run was 200,000 pieces. Material cost of 1230 lb of steel ran $450. This compares with $197 for the 282 lb of magnesium required for the same run.

Saved 32 pct over steel

Despite considerably higher material costs, the shop's savings with magnesium total $169 on the 200,000 pieces. This figures out to about 32 pct less than the cost of the same part machined from steel.

The pleasing cost reduction came about largely through the higher machining speeds possible with magnesium. Recorded cycle times doubled. Machines working on magnesium turn at nearly triple the speed found practical on steel.

Note in these two case studies that one concerns a fairly slow operation, still 24 minutes even after a switch to magnesium. The other involves mass production of parts weighing about 0.001 lb each at the rate of one per second.

While it's difficult to draw generalizations regarding machinability of a particular metal, experience has shown that the figures of Tables I, II, and III are suitable for many shop operations. They have been verified by Dow Chemical through extensive surveys among numerous machine shops.

The consensus of machine shop reports on drilling speeds and feeds (Table I) indicates magnesium may be drilled at speeds 4 to 6 times faster than other metals. These same shops report drills lasting many times longer on magnesium than on other metals, some up to 10 times longer. One New Britain, Conn., tool manufacturer adds, "High speed steel tools last longer on magnesium than carbides do on other metals." Reports cover standard machines using high speed steel tools with generally accepted speeds and feeds.

Tables II and III, covering turning and milling operations, were compiled by survey in the same manner as Table I.

A comprehensive roundup—

What Do We Know About Hydrogen In Steel?

◆ As a result of processing, hydrogen content in steel can become almost any steel user's problem—at one time or another . . . That's why a knowledge of hydrogen entrapment holds more than average significance.

◆ Last of a two-part series, this article provides a summing up of virtually all that is known about hydrogen in steel . . . It surveys research highlights most important to both steelmakers and steel users.

By C. R. SIMCOE
Metallurgist
Battelle Memorial Institute
Columbus, O.

Part II

◆ Both mill metallurgists and researchers have long recognized the importance of the hydrogen embrittlement of steel. As a subject, some of its aspects are still controversial. By definition, however, it is generally agreed that "embrittlement" applies specifically to a loss of ductility as noted in the tensile test.

It has been shown that the embrittlement effect is sensitive to strain rate with ductility increasing at high strain rates. If the hydrogen is removed before plastic deformation occurs, full ductility can be obtained. If hydrogen is removed *after* straining, damage is permanent.[1]

Fully hardened and lightly tempered or very severely spheroidized structures were found to be most susceptible to loss of ductility.[2] The influence of hydrogen content, testing temperature, and strength level was studied in a 3 pct chromium, 0.44 pct molybdenum, and 0.25 pct carbon steel.

The highest strength level studied (about 200,000 psi) was more susceptible to embrittlement at temperatures of 120° and —78° C. than were lower strength levels, but about equally susceptible at —196°C. Embrittlement increased with hydrogen content over the range of 1-8 ppm at all testing temperatures.

The effect of temperature and strain rate on the fracture strain under standard electrolytic charging conditions is also significant. The results of tests on a spheroidized 1020 steel are shown in Fig. 1. As would be expected, the fracture strain of the hydrogen-charged specimens is low at low strain rates.

This fracture strain increases with increasing strain rate until the effect of hydrogen disappears at 19,000 in./in./min. However, the fracture strain versus test temperature curve shows a minimum at all three strain rates where the hydrogen effect is noted.

The decrease in hydrogen embrittlement at low testing temperatures is generally attributed

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Last of a two-part series, this article reviews significant research on the subjects of embrittlement and delayed failure as they apply to hydrogen in steel. The previous installment dealt with permeability, solubility, diffusion and flaking.

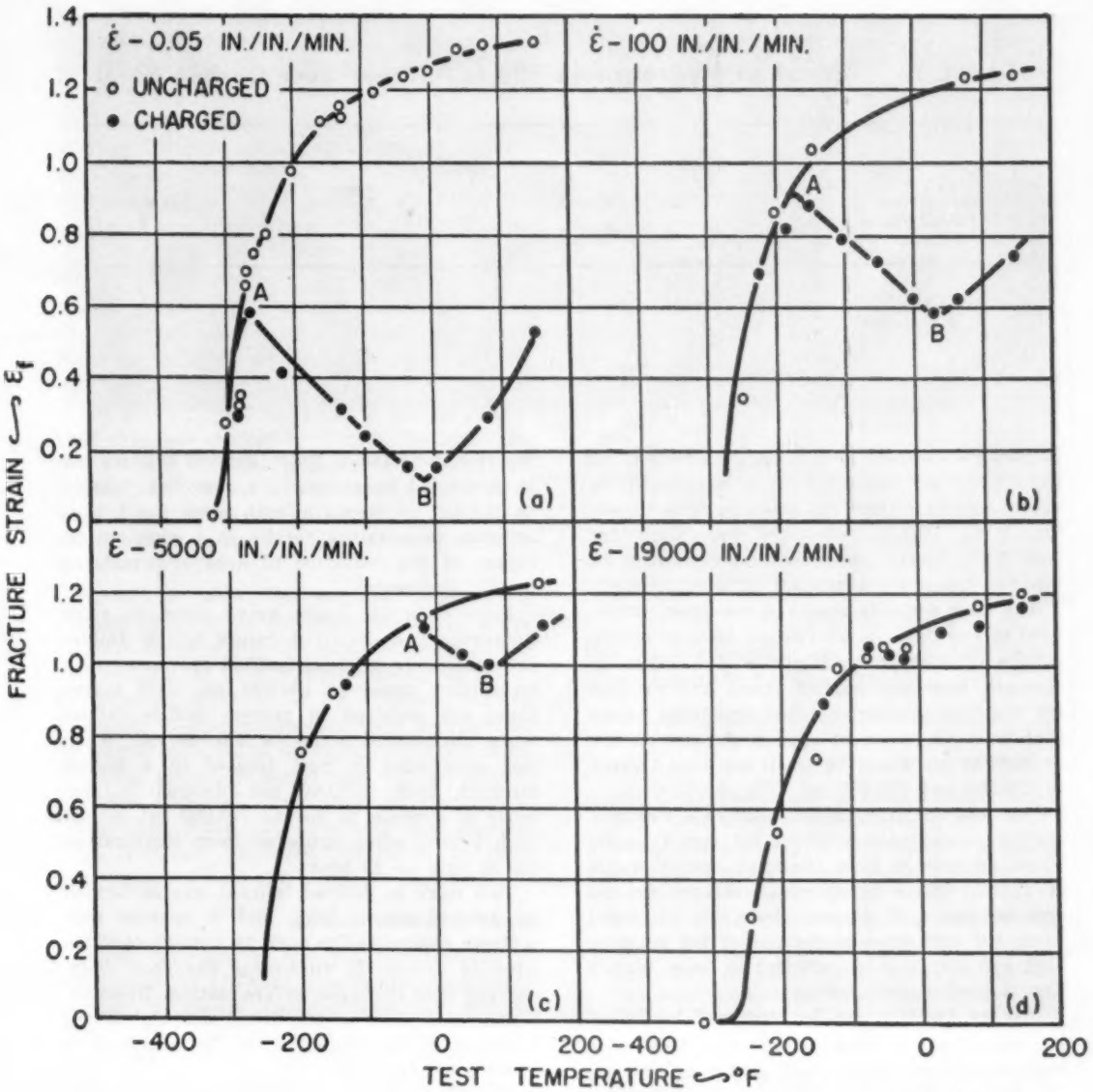


FIG. 1—Fracture strain of spheroidized 1020 steel with and without hydrogen embrittlement.

to the slow diffusion rate of hydrogen. The increase shown here at higher testing temperatures could be attributed to outgassing. It has also been proposed that it is inherent in the hydrogen embrittlement mechanism.

A severely cold-worked 1020 steel can absorb about 100 times as much hydrogen at 250°C. as can fully annealed material.[4] The change in density with cold working does not appear to be great enough to account for this large increase in capacity to absorb hydrogen. Other tests have shown that, after 25 or 45 pct cold reduction, the material is completely embrittled by 4-6 ppm of hydrogen.

In another report, the area of the fractured surface where rupture occurred by cohesive failure in 0.15 pct carbon steel increased in size as the test temperature was lowered, the existence of three steps being noticeable.[5] These steps were related to the number of active slip planes operating at any given temperature.

At room temperature, slip can occur on all three planes: (110), (112), and (123). At low temperature, only plane (110) is active. As shown in Table 1, the temperature where the change in the active number of slip planes from 3 to 2, and from 2 to 1, is increased considerably by the presence of hydrogen. This indicates that the hydrogen is located in mosaic voids and tends to oppose slip during plastic deformation.

Relationship between degree of embrittlement and strength level of the steel has also been explored.[6] Reduction in area as a function of charging time and strength level is shown in Fig. 2.

For a charging time of several minutes, the

TABLE 1. Effect of Hydrogen on Slip in 0.15 per cent Carbon Steel

Change in Number of Active Slip Planes	Not H_2 Charged, F.	H_2 Charged	
		Acid Dip, F	Electrolysis, F
3-2	−4	+14	+41
2-1	−94	−58	−40

200,000 psi strength level is hardly affected, but the 270,000 psi strength level is decreased from approximately 45 pct reduction in area to less than 5 pct. This bears out the observation that both the hydrogen content and the condition of internal stress are important in embrittlement.

The most recently observed condition attributed to hydrogen in steel is the delayed brittle failure of high-strength steels. The effect of strength level and applied stress on the time for fracture in sharp-notched specimens shows that fracture occurs at applied stresses as low as 100,000 psi when the steels are heat treated to 230,000 and 270,000 psi (Fig. 3).

The time for fracture to occur falls within a narrow range between about 0.8 and 8 hours. There appears to be a minimum critical value of applied stress below which delayed failure does not occur. At stresses above this minimum value, the unit stress at the root of the notch is high and may well be sufficient to cause plastic flow and subsequent failure.

Just as ductility can be recovered by aging

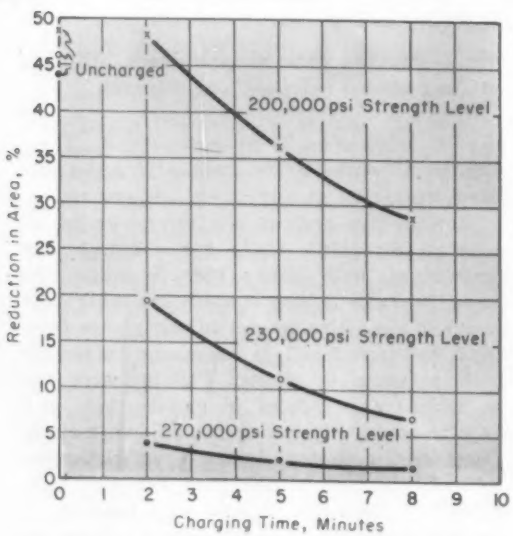


FIG. 2—Effect of charging time on the ductility of SAE 4340 is shown at various strength levels.

the steel for various times, delayed failures can be prevented by aging. In a steel heat treated to 230,000 psi strength level, aging for 1 hour at room temperature results in a complete recovery of the reduction of area of unnotched tensile specimens.

More than 10 hours aging time at room temperature is required before brittle failure does not occur in sharp-notched specimens with an applied stress of 160,000 psi. Still longer times are required to prevent brittle failure when the applied stress is 200,000 psi. When the same steel is heat treated to a higher strength level, 270,000 psi, delayed failures occur at stresses as low as 175,000 psi in less than 1 hour after aging at room temperature for as long as 96 hours.

This work on delayed failures was performed on notched tensile bars, and it appears that a stress concentration such as a notch contributed to failure in specimens that had been charged with hydrogen before testing. However, failure can occur in unnotched material if the hydrogen is introduced while the specimen is under a tensile stress.

The effect of several testing variables on the time for rupture to occur was studied in unnotched wires.[7] The effect of various additions to the electrolyte, variations in current density, variations in the electrolyte, and temperature were reviewed.

Varying the concentration of the sulphuric acid electrolyte from 0.1 to 2.0 normal decreases the rupture time from 25 to 5 minutes when the applied stress is about 1/20 of the ultimate tensile strength of the steel. Additions of tellurium to the electrolyte to promote hydrogen entry decreases the time to rupture by a factor of 4 when the tellurium is increased from 0.06 to 0.12 mg/ml.

Further increases of tellurium up to 8.0 mg/ml have little additional effect. Variations in current density between 0.32 and 6.45 also have little effect. Increases in temperature from 53° to 86°F do not influence the time to rupture, but further increases from 86° to 109° and to 126°F increase the time for rupture from 10 to

34 and 34 to 100 minutes, respectively. Additions of sodium sulphate, magnesium sulphate, and aluminum sulphate decrease the effect of tellurium.

It is claimed that conditions which favor hydrogen pickup also favor formation of colloidal solutions of tellurium. From this, a mechanism is proposed whereby the electrical charge on each colloidal particle which is in a thin layer at the cathode creates a large potential gradient.

This gradient increases the velocity of the hydrogen ions approaching the cathode. It promotes the penetration of the hydrogen as protons into the metal of the cathode.

The delayed fracture of 0.8 to 0.9 pct carbon steel clips was studied by introducing hydrogen into the clips by cathodic charging in 2.5 normal H_2SO_4 for ½ hour at a current density of 2 amps/clip.[8] It was found that hydrogen lowers the deflection of the clips at fracture from 1.10 in. down to 0.300 in.

Aging at room temperature produces a gradual recovery of strength. After 115 hours at room temperature, the mean breaking deflection is 1.034 in. This is approximately 93 pct of the breaking deflection of the original material.

Results of delayed-fracture tests in which all specimens were set to within 0.2 in. of the mean breaking deflection shows that 7.7 pct of the hardened clips fail, even when no hydrogen is introduced. When the specimens are charged with hydrogen but aged 115 hours at room temperature, 71 pct fail within 10 minutes.

Stress relieving helps

Stress relieving at elevated temperatures in addition to the 115-hour room-temperature aging further decreases the incidence of delayed failure. It is believed that the delayed-failure mechanism can be explained by an extension of the Griffith crack theory of brittle failure.

Most of the recent theories on the embrittlement and delayed failure in steel from hydrogen are based on extensions of the original Griffith crack theory. This theory, proposed many years ago to explain delayed failure in glass, is based on the pre-existence of cracks in brittle materials. If these cracks are greater than a certain critical size, they will propagate when a stress is applied.

The time delay before failure represents the time necessary for the pre-existing Griffith cracks to increase in size until they are large enough to propagate on a macro-scale. Finally, when a crack has reached a certain size, the remaining material can no longer support the applied stress, and failure occurs.

In recent years, a report pointed out that hydrogen atoms might cluster at dislocation arrays to form the Griffith crack.[9] Previously it was considered that voids and microcracks were already present for hydrogen precipitation.

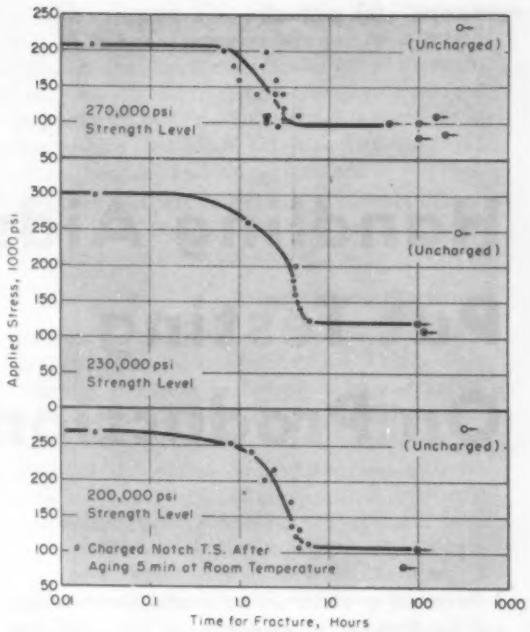


FIG. 3—Stress rupture results on SAE 4340 tested after charging in H_2SO_4 and aging.

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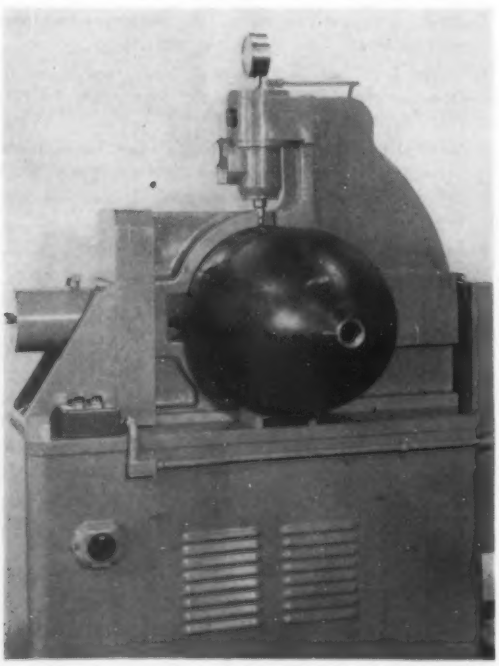
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Where 100 pct check's required—

Handling Aids Put Testing On Production Basis

◆ Increased emphasis on automatic metalworking and handling has in some instances increased the need for 100 pct inspection . . . Such testing must itself become almost a production operation . . . This has influenced test machine design.

◆ One result has been to directly incorporate materials handling features into inspection gear . . . Conveyors feed work to and discharge testers in many instances . . . In others, test equipment has been made more mobile to go to unwieldy work.



CONVEYOR-FED, this special Brinell hardness tester fully protects 500-lb aerial bomb bodies against deflection while under test load.

◆ INCREASED emphasis on automatic working and handling is creating a growing need for 100 pct inspection. Testing, in many instances, has become almost a production operation on such items as castings, tubing and welded parts. Because of this trend toward checking every piece rather than a sampling, testing machines are undergoing some marked changes.

Much modern-day equipment, in order to speed quality control and inspection, now directly incorporates materials handling features into its construction.

De-emphasis on the "spot-checking" method has also resulted in development of equipment capable of handling large masses. Parts weighing as much as several tons are sometimes lifted and supported during the test cycle.

The commonly accepted Brinell hardness test, for instance, is now being performed on a production basis on a machine with a 50-in. throat depth, 26-in. vertical opening and a 24 x 72 in. support table. This tests large aircraft forgings at Alcoa's Cleveland Forging Plant. The machine operates in conjunction with a conveyor.

One plant's problems involved 19 in. diam 500 lb aerial bombs. A standard 3000 kg load applied to the OD of a bomb's body deflected its shape and threatened to permanently spring it out of round, or conceivably break it. Handling and deflection problems were solved by loading the bomb body from a conveyor matching that on the machine in height. After the part was rolled into place, the operator pressed a start button with his knee. This actuated a section that lifted it slightly from the rollers while clamping it tightly. Then the Brinell ball descended, applying the load. Relative hardness was determined by a "direct reading" dial which eliminates the need for measuring the impression's diameter with a microscope.

At Mallory Sharon Titanium Corp. it was



TRUCK BRAKE DRUMS get fast, simple hardness check with this foundry setup. Brinell unit has semi-portable testing head incorporating own anvil.

necessary to test the Brinell hardness of 20-in. diam titanium billets. These are up to 5-ft long and may weigh 4000 lb. Furthermore, testing is done in a spiral pattern around the billet's OD. Billets are loaded by overhead crane onto a roller-bearing carrier. The carrier's horizontal rollers are also mounted in roller bearings to facilitate revolving the billets to obtain the spiral testing pattern.

The loading carrier is manually moved along the track to testing positions beneath the Brinell ball. As part of the semi-automatic cycle, a lower piston rises to contact the billet's lower surface so that the 3000 kg Brinell load is not placed on the carrier itself. Except for loading and unloading, two men can handle the operation.

Bridge-type tester's versatile

For hardness testing of large work of varied size, shape and quantity, a bridge type tester is often used. This could be classified as a standard type since it is not designed for a particular part or purpose. It is, therefore, very versatile in the work it can accommodate. On this machine, the cross head will go down to zero opening and up to provide a 52-in. high working space. Travel up and down is powered by a motorized speed reducer. This moves the head on vertical screws. Distance between the screws is 40-in. Some incorporate "direct reading," though it is not usually found on this type. The anvil location is almost at floor level to facilitate moving large work.

Another solution to the handling problem in relation to hardness testing is to run the roller through the machine. A tester at the Chrysler Corp. of Canada uses this system. Here, a line of cylinder blocks extends several hundred feet and the Brinell test is at one of the first stations. Normally the conveyor's rollers are in a raised position so that the blocks can be rolled through. When a test is desired, the operator presses a knee switch. Automatically, the rollers drop down, leaving the block supported by hardened steel rails when the load is applied.

At the conclusion, rollers again rise up, lifting the block from the rails. This makes it possible to roll the block down the line again.

Bring test to the work

In treating heavy or bulky work, sometimes it is better to use still another method. This is done by keeping the work on the conveyor and bringing the testing means to it. An example of this is truck brake drum testing at Gunite Foundry.

Because the drums are hollow, the wall requires support at the testing point. A hydraulic semi-portable testing machine is suspended from a counterweight over the conveyor. This is connected to a power unit by two flexible hose. A foot switch adjacent to the station operates the cycle. The head incorporates its own anvil which is inserted through the hole in the brake drum. Testing is made adjacent to the hole with the Brinell impression made in the drum's top surface. The section is adequately supported underneath during the test. Here again, a "direct reading" dial indicates relative hardness.

An adaptation of the conveyor type line includes a spray gun for marking either acceptable or rejected parts. The gun works from signals initiated by an electric indicator.

This is a refinement of the "Color-Glance" mechanism developed by Steel City Testing Machines, Inc., Detroit. In the initial application, parts which were of acceptable hardness were sprayed. Sorting was done at a remote station farther down the conveyor line. Unpainted parts were sent to the heat treating department to be annealed; others were sent on for machining.

Production line techniques are used in connection with other types of tests, too, although not to the same degree. Cables, for instance, are proof-tested for tensile strength in gangs rather than individually.

Hydrostatic testing machines for shell testing are another example. These are multi-station arrangements which pace the operator at a given speed. Another feature of this particular machine is that in case of a reject, the machine locks. A chief inspector, foreman or government inspector must then use a key to release the rejected shell. Other larger hydrostatic testing machines incorporate elevators to lower large parts in soluble oil tanks for testing, then lift them clear after a cycle is completed.

Few applications so far have actually eliminated the operator. Generally accepted reasons: high cost and, probably, a feeling that tests should be witnessed by someone during their running, if not actually controlled.

800-lb castings—

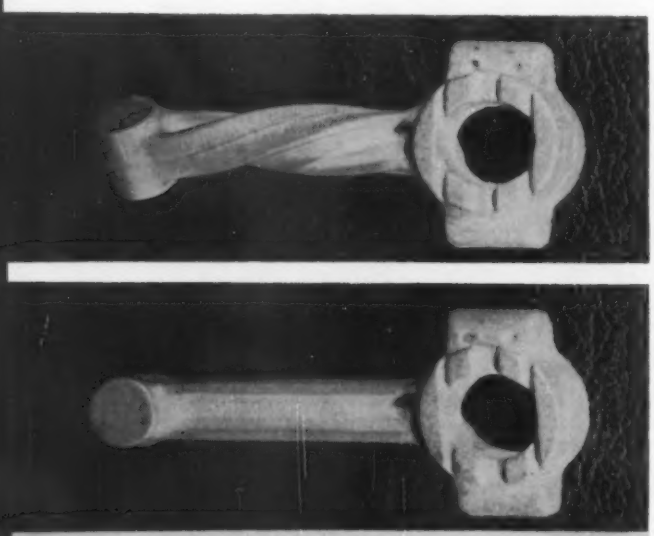
New Advances Swell Shell Molding Uses

Part I

◆ Confidence in shell molding's future continues to grow . . . Based on present and anticipated resin binder consumption, use of shell molds may double by 1958 . . . Already, shell mold castings weighing 800 lb are reported.

◆ Metal sections 4-in. thick can be cast in 1/4-in. shell molds . . . Getting down to cost comparisons, 100-lb castings are now believed economically feasible—twice the weight thought justifiable in mass production a year ago.

By O. W. WINTER, Manager,
Shell Mold Div., Beardsley & Piper, Chicago, Ill.



CONNECTING rod of aluminum bronze demonstrates ductility possible in shell molded castings. Green sand casting broke under 10° bend.

◆ ORIGINAL claims and counterclaims left many casters confused as to the actual merits of shell molding. Some took a "wait-and-see" attitude. Others held to their convictions that the inherent advantages of the process were bound to change casting practices in many foundries. Recent developments not only validate the latter viewpoint, but go even beyond earlier expectations.

Late in 1955, for example, founders still talked of pouring shell castings approaching 200 lb each. Now, 800-lb shell mold castings are reported a reality.

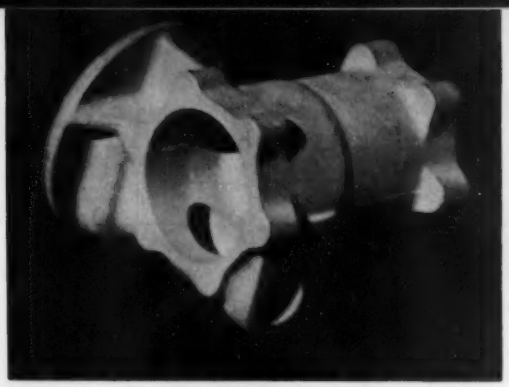
Some production people still find castings weighing more than 100 lb generally unfeasible from a cost viewpoint. But even a 100-lb limit is double that thought practical by many less than 12 months back.

As predicted earlier, hot and cold mulled sands for shell molds have pushed dry resin-sand mixtures almost to the point of obsolescence. As a consequence, large savings in costs of shell molds have been realized through the halved resin consumption resulting.

This is Part I of a two-part article on most recent developments in shell molding. Part II, dealing with improvements in shell mold sands, will appear in The Iron Age, October 20, 1956.

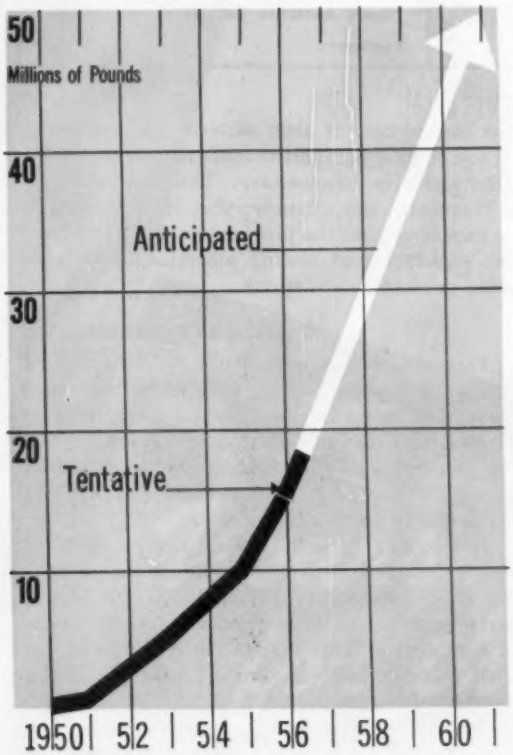
These developments, and others equally important, explain the significant jump in use of phenol-formaldehyde resin—the organic chemical that shell molders generally employ to bind sand grains to one another.

In 1950, certain chemical producers seriously considered disposal of some facilities then synthesizing the resin: consumption was much below capacity. Sales moved to one-half million pounds in 1951, then to 5 million in 1953, and 10 million in 1955. Projected 1956 sales come to a tidy



APPROXIMATE SALES

Phenol—Formaldehyde Shell Mold Resin
(In Millions of Pounds)



15,000,000-lb figure, with four times that amount anticipated in 1961. Certainly, resin producers have little cause to doubt shell molding's future.

Present thinking on value of shell mold casting can perhaps be characterized as a somewhat belated awakening. Basic facts regarding the process remain essentially unchanged. It was and still is a casting process whose utility falls somewhere between sand and investment casting.

Some term shell molding a high-production sand casting method, others a semiprecision investment casting process. Either definition can be right, depending on the viewpoint of the user. Actually, it is a process wholly unto itself, as is die casting.

Generally accepted tolerances in shell mold castings are most often closer than those practical with sand, permanent mold, plaster mold and centrifugal casting methods. Tolerances from ±0.003 to ±0.005 in. per inch of casting can be held between one point of a mold section and another. Across parting lines, tolerances of ±0.005 in. are attainable with molds bonded by liquid resins, and ±0.010 in. with solid resin adhesives.

Surface finish attainable in shell mold casting spans the gap between the finishes possible with sand and precision investment processes, and overlaps both. The actual range runs roughly between 100 and 250 microinch, rms. Castings have been produced with a surface smoothness down to 60 microinch, rms.

Benefits of the shell molding process by no means limit themselves just to design advantages. They also include: (1) the possibility of higher casting production rates, (2) reduced cleaning costs, (3) weight reductions in cast parts of 10 to 20 pct, (4) higher usable casting weight and consequently higher product yield from metal melted. All these positive factors have existed almost since initial interest in shell mold casting.

Finding wider application

Most recent developments have served to reduce cost of shell mold casting, improve casting quality, and increase its range of application. These advances, and their acceptance, have helped pave the road leading to rapid growth of the process in recent months.

Shell mold castings were thought limited to parts of small size and thin sections not so long ago. This opinion prevailed despite one automotive manufacturer who had for some time serenely cast thousands of crankshafts daily in shell molds. These crankshafts weigh near 60 lb each, and involve metal sections about 2½ in. diam. Thanks to such examples, the negative reaction frequently met on mention of shell molds and thick castings in the same breath has begun to vanish.

Economics of the situation still generally limit shell casting weight to below 100 lb. Main reason for this lies in wall thickness required of shell molds for heavier castings. As mold thickness grows, more sand, resin and man-hours are required. Costs per finished mold go up rapidly.

Limiting factor is not so much total casting weight, as it is metal thickness in any one mold section. Metal thickness—more accurately, metal mass per square inch of mold cavity area—vitally affects the rate of mold disintegration.

Resin binder burns at approximately 720°F. In the presence of molten metal, disintegration of the mold cavity surface sets in rapidly. So it's essential and now recognized that the sand in a shell mold must be rammed hard to hold dimensions and surface quality of the casting.

How To Choose The Right Shell Blowing Method

	Cold Plate Blowing	Hot Pattern Blowing
Technique	Blowing and venting sand through a cold contour blowplate, followed by curing of the shell back under a radiant furnace	Blowing and venting sand into a cavity between two resistance-heated patterns. Curing occurs in place.
Advantages	Much lower tooling cost Eliminates clogging problem Quick pattern changeover	Greater flexibility Shells cure slightly faster Highly accurate control of shell back contours.

From this reasoning, it's easy to appreciate why founders felt earlier that the shell molding process was better suited for casting thin metal sections than thick. This might still be the opinion, had it not been for the successful shell casting of heavy sections, when the mold was properly made. A better understanding of the shell molding process also helped bring about the change in thinking.

Fuller appreciation of sand's insulating effect, for example, helped pave the way toward thicker-sectioned and heavier castings. Steel shot, sand, gravel and other shell mold backup materials assist in this function by conducting heat away from the mold back wall. Steel shot backing, to cite the automotive crankshaft casting job mentioned earlier, made possible casting in shell molds $\frac{3}{8}$-in. thick. Gravel and sand backup generally prove less helpful than shot for heat dissipation due to lower thermal conductivity.

Mold weight sets limit

Limit on weight of molten metal poured into the shell also depends on total mold weight. Weight of fluid metal creates a metalstatic pressure tending to separate the mold halves, and to distort the mold cavities. To control this, shell backup materials perform another important function: supplying mass to overcome metalstatic pressure. Steel shot does this job better than gravel or sand, by virtue of its greater weight.

A pump manufacturer successfully pours some 60 lb of cast iron in a $\frac{1}{4}$-in thick shell mold. Adhesive bonded, backed with gravel and gated vertically, the entire mold including cores weighs only 15 lb. This provides a 4:1 weight ratio. In ferrous shell mold casting practice, a 2:1 ratio is generally considered good. Iron pump bodies range up to 4-in. thick.

The foregoing illustrates well the scope of shell molding today. There remains, however, the cost picture of shell patterns and coreboxes. Much of past equipment costs now seem excessive, and even unnecessary. This has developed a frequently met attitude: that shell molding is so expensive that the process justifies itself from the standpoint of tooling amortization only in mass production situations.

Costs aren't unreasonable

This need not be necessarily so. The cost of producing a shell casting, with or without shell cores, has in many cases proved comparable to or less than that of conventional molding methods. Once initial shell tooling cost is overcome, new developments in shell molding practice will serve effectively to reduce costs.

The matter of initial shell tooling costs is another matter. Generally speaking, a shell casting is no more accurate than the shell mold and cores from which it is produced. These shells in turn depend largely upon the precision of the shell patterns and core boxes. Accuracy is the watchword here.

Under presentday circumstances, at least, few pattern shops are either equipped, staffed or trained to handle shell mold tooling. The average patternmaker, metal or wood, does not seem to be the man for the job.

This is no reflection on the patternmaker. It's simply that tooling for shell molding lends itself more closely to the type of skills and equipment found in a tool and die shop. Once that basic fact is recognized, tooling cost will diminish.

Also, it is not necessary to use expensive cut-and-try procedures. Tooling for shell casting can be pre-engineered with available technology.

Many also recognize the close kinship between shell molding and diecasting. Certainly this relationship is at least as close as shell molding to investment casting or permanent molding. This holds particularly true of the tooling aspect of shell molding.



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New Technical Literature:

Catalogs and Bulletins

Bearing balls

An amusingly written, eight-page booklet on the application of carbon steel bearing balls has been released by a manufacturer of deep-hardened and tempered steel bearing balls, barrel finishing materials and tumbling barrels. Entitled "Famous Case Histories from the Files of the Abbot," the booklet is based on a series of advertisements which have attracted wide attention. Technical data and application information are included. *Abbott Ball Co.*

For free copy circle No. 1 on postcard, p. 117

Rider trucks

Electric powered trucks are covered in a new catlog. The 8-page folder contains engineering specifications, capacities and dimensions on small rider type trucks built by one firm. Design features of these models, with illustrations of all major components has been included. Data on the following types is included: pallet trucks, high and low lift platform trucks, counterbalanced and outrigger trucks, tractors, plus many special models. *Moto-Truc Co.*

For free copy circle No. 2 on postcard, p. 117

Dc motors

Direct-current motors, ½ through 200 hp, and motor-generator sets up through 200 kw output are described in a new bulletin. It covers shunt and stabilized shunt wound, compound wound and series wound motors in eight different enclosures plus a matching line of motor-generator sets for reliable conversion of ac to dc current. Included is a cutaway view of one of the motors. This shows end brackets, bearings, commutator, windings, commutating poles, brush holders, conduit box, and ventilation, and line drawings showing a variety of frame sizes. *Allis-Chalmers Mfg. Co.*

For free copy circle No. 3 on postcard, p. 117

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 117.

Circular weldments

Circular weldments are the subjects of a new eight-page catalog. It highlights, with picture and text, various types of weldments and rings manufactured by one maker. It covers the facilities offered at the company's plant. Basic principles of flash welding, along with cross section photos of flashwelds on various metals, is also featured. *Dresser Mfg. Div.*

For free copy circle No. 4 on postcard, p. 117

Cam followers

Detailed description is given of one company's cam followers and cam yoke rollers in a new folder. Using diagrams and illustrations, it gives load and life ratings, specifications for high capacity studs and regular type and new cam yoke roller bearings. *Smith Bearing Co.*

For free copy circle No. 5 on postcard, p. 117

Molybdenum chemicals

Sources and applications of molybdenum chemicals are discussed in a bulletin. It presents information to help industrial users select economical and convenient starting materials for current molybdenum chemical applications. These include catalysts, fertilizers, pigments, lubricant additives, metal treating compounds, ceramic frits and colors, and analytical reagents. A chart shows high-tonnage molybdenum chemicals produced and supplied. *Climax Molybdenum Co.*

For free copy circle No. 6 on postcard, p. 117

Quality control

Statistical quality control procedures adaptable to any manufacturing process are covered in a recently issued management report. Charts show how to interpret warning signals before quality gets out of control. Any successful manufacturer who intends to stay in business doesn't have to be sold on the necessity of maintaining a quality level in his products, it points out. *Plastics Div., Monsanto Chemical Co.*

For free copy circle No. 7 on postcard, p. 117

New alloy

"SMZ Alloy — An Inoculant for Cast Iron," has just been published. The 16-page booklet discusses the metallurgical aspects of inoculation and describes, with illustrations, how to inoculate irons with the alloy to reduce chill depth and improve machinability, tensile strength, and transverse properties. The alloy is a balanced graphitizing inoculant containing silicon, manganese, and zirconium. *Electro Metallurgical Co., div. of Union Carbide & Carbon Corp.*

For free copy circle No. 8 on postcard, p. 117

Magnets

Rectangular and rail handling magnets are covered in a new data sheet. The bulletin describes one firm's line of magnets. These range in size from 19 x 32 in. up to 28 x 74 in. It gives data on construction materials, headroom required, dimensions, etc. *The Ohio Electric Mfg. Co.*

For free copy circle No. 9 on postcard, p. 117

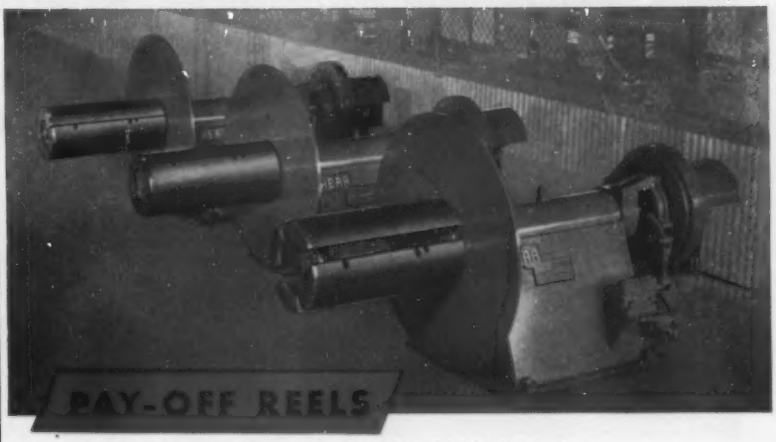
Temperature Controller

A thermistor-actuated temperature controller is illustrated in a new brochure. The controller is designed as an individual unit which is plugged into a separate power supply chassis. For multi-point control, brochure shows how the requisite number of controllers can be plugged into a single power supply chassis. This centralizes control and conserves space, but maintains a choice of locations for temperature adjusting controls. *Fenwal Inc.*

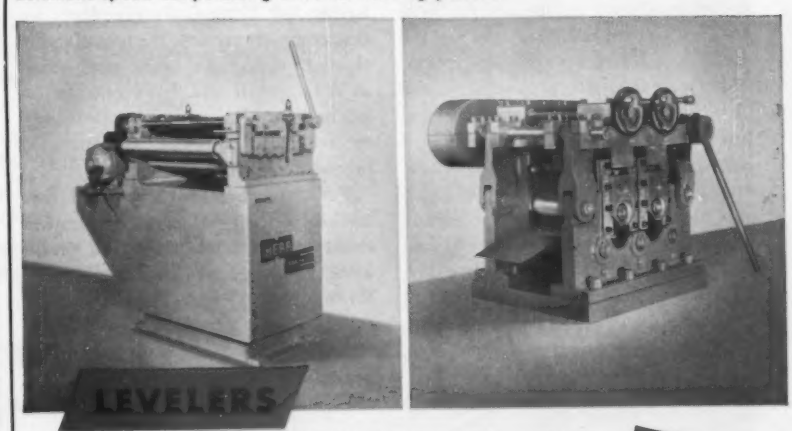
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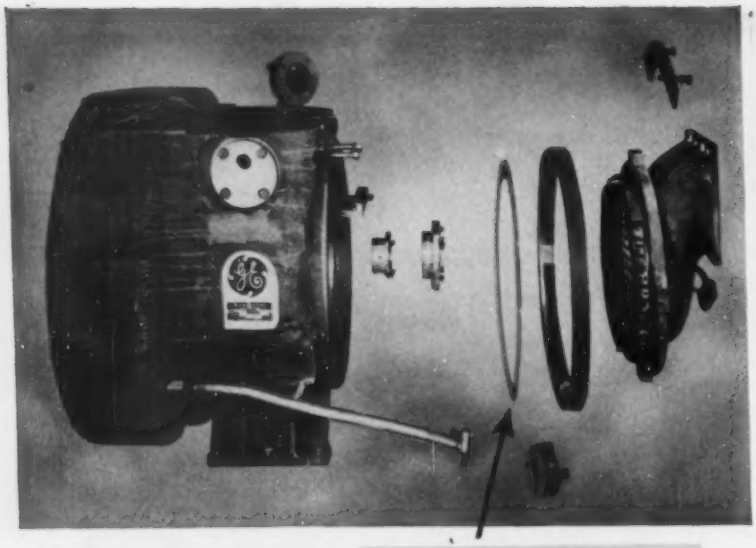


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FREE TECHNICAL LITERATURE

Weld deposits

Some dynamic mechanical properties of heat-treated low-alloy weld deposits are listed in an illustrated booklet. Weld deposits of nickel-molybdenum-vanadium steel were studied, it states. These were found to have excellent ductility, and exceptional endurance limits under cycles of reversed stress. *International Nickel Co. Inc.*

For free copy circle No. 11 on postcard, p. 117

Rust preventive

Attractive eight-page booklet covers a new versatile product. Booklet explains why the material is so effective as a rust preventive, paint extender, and reinforcing paint additive. Profusely illustrated, it contains a text which is written so that it may be readily understood by laymen, painters, and paint chemists alike. *Requests for copies should be made on company letterhead to The Flood Co., Hudson, Ohio.*

For free copy circle No. 12 on postcard, p. 117

Gas analysis

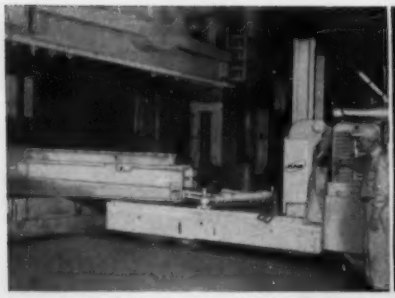
Performance features and specifications for both Speedomax type G and the new Speedomax type H thermal conductivity gas analysis equipment (for measuring gas in air or binary mixtures) have been published in a new folder. It presents a basic description of the direct thermal conductivity method of measurement for process gases, cites typical application examples, and explains under what process conditions the type G, or the more standardized type H instruments should be used. All ranges are listed. *Leeds & Northrup Co.*

For free copy circle No. 13 on postcard, p. 117

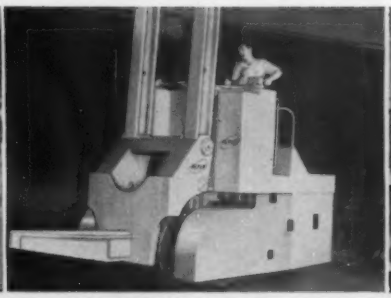
Rugged batteries

Batteries that have been developed to fill all power needs of electric industrial trucks are described in a new bulletin. It gives details of battery construction, posts, basic Z grids, regenerative oxide material, plate encirclement, glass retainers, rubber separators, and element protectors. *Gould-National Batteries, Inc.*

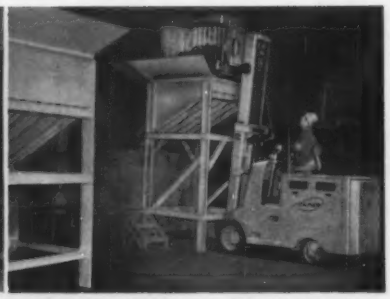
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1 *ELPAR Die Handler has separately operating pusher arms for fast, flexible die positioning.*

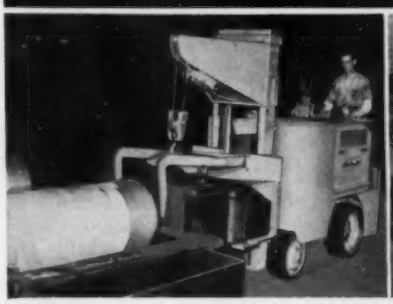


2 *New ELPAR Ram Truck has dual power plants to carry 40-ton loads readily.*

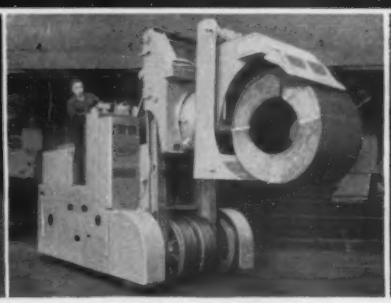


3 *Rotating Forks on ELPAR truck dump forgings into hopper of cleaning machine.*

TEN TRICKS WITH TRUCKS IN METAL-WORKING



4 *Special ELPAR truck safely pulls bearings from ends of steel mill rolls.*



5 *ELPAR Clamp handles coils of strip in any position from horizontal to vertical.*



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7 *ELPAR Plow Attachment levels scrap in car, eliminates a dangerous manual job.*

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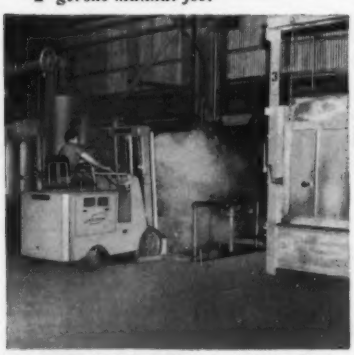
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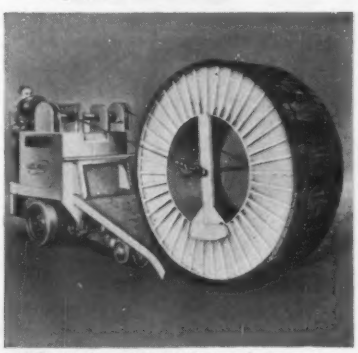
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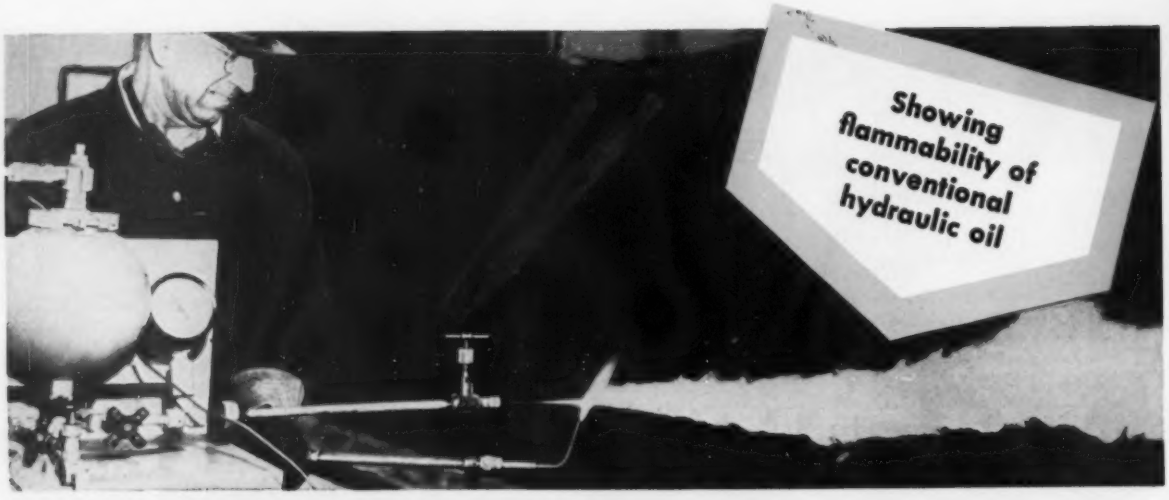
8 *ELPAR Foundry Truck puts cores right into oven where heat reaches 400°F.*



9 *Special forks lower hot load of annealing castings below floor into quench tank.*



10 *Unique ELPAR truck has tipping platform and winch to handle huge cable reels.*





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This section starts on p. 112.

External cotters

Dimensional data and price information of fourteen external cotters which the company considers standard are presented in a data sheet. Pin dimensions for each cotter are given. *Hunter Spring Co.*

For free copy circle No. 15 on postcard, p. 117

Color codes

Handy chart identifies Aluminum Association color codes for aluminum rod, bar and wire alloys. Of special interest to fabricators, the chart lists 32 alloys and their respective color codes which were recently adopted by the Aluminum Association for use throughout the country. It also depicts one aluminum company's color coding for identification tags on wire alloys. It is designed as a quick reference wall chart or for insertion in a three-ring binder. *Kaiser Aluminum & Chemical Corp.*

For free copy circle No. 16 on postcard, p. 117

Rebuilt machine tools

Guaranteed rebuilt machine tools are listed in a 42-page pocket-width catalog. Supplier says that with very few exceptions, all tools listed are located in their warehouses. Quite a few have already been completely rebuilt and many others are on the shop floor in the process of being rebuilt. Still others, it states, are in such good service that rebuilding is not required. As a result, the catalog indicates quick delivery is probable. List includes a wide variety of standard and special machine tools. Three pages of miscellaneous listings contain pumps, engravers and materials handling units. *Miles Machinery Co.*

For free copy circle No. 17 on postcard, p. 117

Speed reducers

"Speed Reducer Engineering Manual," presents application information such as hp ratings, torque capacity, overhung load values, dimensions, construction features, installation and maintenance for single, double and triple reduction. Speed reducers may be driven by electric motors, gas, oil or diesel engines. *Westinghouse Electric Corp.*

For free copy circle No. 18 on postcard, p. 117

Hardening rail ends

Hardening rail ends is covered in a new brochure. The bulletin describes a high-speed, low-cost automatic method of selectively hardening the wearing surface at the end of each rail. Illustrations show metallurgical characteristics of rails. *Selas Corp. of America.*

For free copy circle No. 19 on postcard, p. 117

Polyethylene

Plastics parts fabricated from irradiated carbon-black filled polyethylene are presented in a new technical report. The new material is a black, tough, flexible plastic with physical properties, heat and chemical resistance reportedly superior to conventional high pressure polyethylene, from which it is derived. Yield strength at low temperature is said to be double that of polyethylene, and creep deformation is reduced to approximately 10 pct of the value obtained for polyethylene. Due to its cross-linked structure, it can reportedly be carried to its decomposition temperature without melting. At 300°F it retains a tensile strength of 500 psi. *Chemical Development Dept., General Electric Co.*

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Unbreakable windows

No broken windows ever! That's what a new bulletin says in introducing corrugated fiberglas building panels for industrial daylighting. Quality controlled to assure complete satisfaction in use, it says, they are shatterproof, lightweight and easy-to-use. Brochure says panels have superior diffusion characteristics to provide maximum usable light without glare. Built-in colors never need painting. Also described are company's line of unbreakable flat panes. *Alsynite Co. of America.*

For free copy circle No. 21 on postcard, p. 117

Conveyors

Catalog containing 48 pages covers one company's patented products and custom built conveyor equipment including: (1) A completely automatic elevator for handling small parts magnetically, (2) A totally enclosed bulk material handling conveyor featuring a two-directional chain to convey in any direction. (3) A precision piano hinge steel belt conveyor elevator press made, (4) Precision piano hinge steel belt conveyor, fixture welded, (5) Steel belt and vibrating type parts feeders, and Custom built conveyor equipment. *Prab Conveyors, Inc.*

For free copy circle No. 22 on postcard, p. 117

Vertical pumps

Answers to questions about one company's vertical turbine pumps are published in a comprehensive book. Written by one of the foremost authorities on pumps, this 72-page hand-bound book covers the use of pumps for municipalities, industry and irrigation. One section is devoted to methods of selecting deep well centrifugal pumps. Charts for determining size and type of vertical pumps operating from 585 to 1750 rpm are included. Other sections set forth efficiency variations in deep well centrifugal pumps and selection of deep well pumps. *Requests for copies should be made on company letterhead to Layne & Bowler, Inc., Memphis 8, Tenn.*

For free copy circle No. 23 on postcard, p. 117

Aluminum bars

New hollow aluminum bar stock is introduced in an illustrated technical brochure containing full details on the metal. The 8-page publication discusses tolerances, mechanical properties, and applications of the hollow machining stock. Case studies and comparison charts, demonstrate machining performance of the new aluminum material compared to conventional solid bar. *Harvey Aluminum.*

For free copy circle No. 24 on postcard, p. 117

Pushbutton switch

Pushbutton control for vending machines, appliances, commercial computers and light industrial equipment is provided by a new switch. New data sheet says switch can help manufacturers reduce assembly time by (1) providing a complete, ready to install unit, (2) permitting easy bracket to panel attachment, and (3) enabling fast, snap-on wiring. *Micro-Switch, div. of Minneapolis-Honeywell Regulator Co.*

For free copy circle No. 25 on postcard, p. 117

Grinding wheel balancing

An automatic balancing feature for one company's plain, roll and centerless grinding machines is reviewed in a kaleidoscope type publication. Literally brimming over with colorful abstracts, charts and photos, this brochure explains how automatic grinding wheel balancing is done in a few seconds under dynamic conditions with the spindle rotating at its operating speed. A four color spread graphically illustrates claim that this is 10 times as accurate as conventional balancing. *Cincinnati Grinders Inc.*

For free copy circle No. 26 on postcard, p. 117

Pneumatic controllers

A 56-page bulletin describes a new series pneumatic controller. Brochure is illustrated by more than 75 photos and drawings, describing the new high sensitivity, wide control-band controllers for temperature, pressure, flow, vacuum, etc. *The Bristol Co.*

For free copy circle No. 27 on postcard, p. 117

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1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
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31	32	33	34	35	36	37	38	39	40
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51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70

If you want more details on products advertised in this issue fill in below:

Page ..... Product .....

Page ..... Product .....

Your Name .....

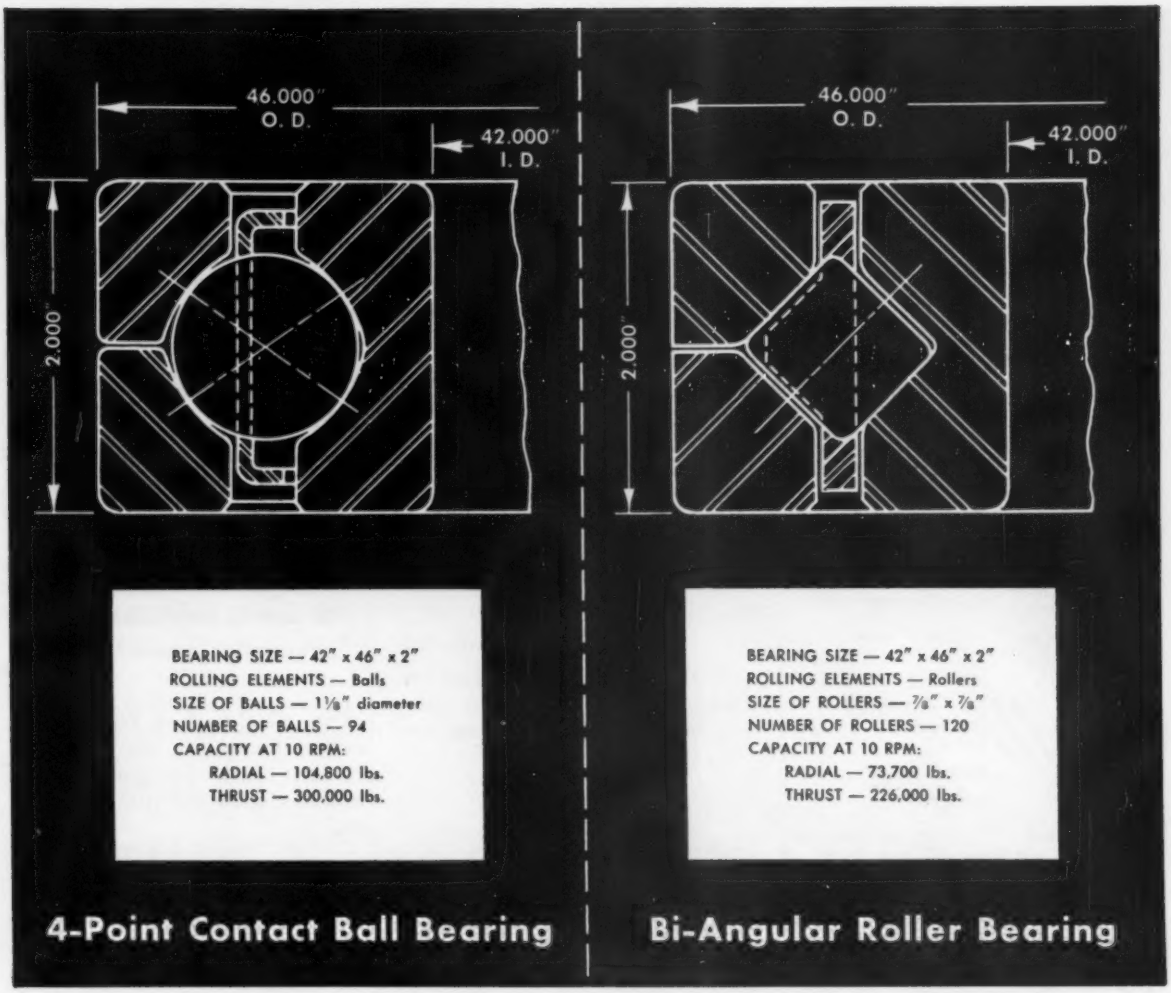
Title .....

Company .....

Co. Address .....

City ..... Zone .....

State .....



SURE we make both, but we recommend only one

Yes, Kaydon manufactures both — 4-point contact ball and bi-angular roller bearings in the same diameters and widths. BUT—we would in almost every instance recommend the former. Why? Because our field application reports consistently prove that the 4-point contact ball bearings are better for most applications than the lower capacity bi-angulars *(See capacity figures in drawings above.)*

Another important difference between the two bearings is that the 4-point contact ball bearing *is not limited to low speeds,* whereas the bi-angular normally should not be used above 10 rpm and usually is suitable only for oscillation. Then, too, the torque in the 4-point contact ball bearings is generally much lower.

Kaydon's unbiased recommendations result from years of bearing design, application and manufacturing experience with *all types* of ball and roller bearings up to 124" in diameter. So, why not contact Kaydon first?

K-563

THE KAYDON ENGINEERING CORP.

MUSKEGON • MICHIGAN

All types of ball and roller bearings — 4" inside diameter to 124" outside diameter . . . Taper Roller • Roller Thrust • Roller Radial • Bi-Angular Roller • Spherical Roller • Needle Roller • Ball Radial • Ball Thrust Bearings

the ONLY
PORTABLE NIBBLER *that* CUTS
10 Gauge Steel



Model HN-C for 10 gauge Stainless Steel and 8 gauge Mild Steel. 6" radius.

Without Distortion!

A big statement ... and only Fenway can make it! Our portable Nibblers have solved unusual problems for hundreds of users. Complete line includes the 14 gauge Nibbler and a light-duty 18 gauge Nibbler, and a special 90° head for each.

RCA—DU PONT—GENERAL MOTORS—and many others, use Fenway Portable Nibblers!

PAT. #2278174 #2278311 #2535631



Model MN-C for 14 gauge Stainless Steel and 13 gauge Mild Steel. 1" radius.

ALSO AVAILABLE: CORRUGATED, JIGSAW ASSEMBLY & AIR TOOLS

WIRE • PHONE • WRITE for complete information

FENWAY
MACHINE COMPANY INC.
Edgemont & Clementine Sts.
Philadelphia 34, Penna.

Distributed by EASCO PRODUCTS

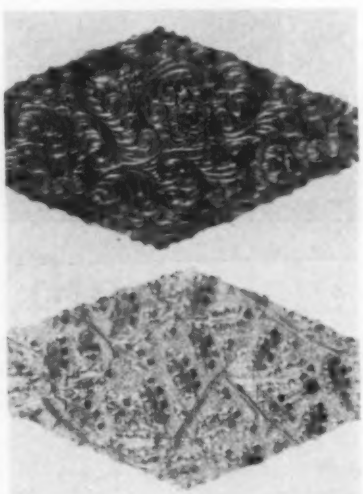
FABRICATING: Aluminum

Aluminum goes artistic . . . Sheet and rolled stock is embossed with many varied designs . . . Anodized color finish gives soft, yet dramatic effect . . . Many uses seen.

After five years of research and development, a midwest design firm has decided to market a new line of sheet and rolled stock—embossed with designs. The product contains an anodized finish in many colors. These are soft, gentle pastel-like shades. However, the metallic look gives a somewhat dramatic appearance.

Can Be Converted

Utilizing a patented extrusion process, the company produces embossed sheet stock for conversion into window shutters, wall paneling and various other fabricated products.



Intricate designs appear in many soft metallic colors.

Forty Varied Patterns

A series of decorative designs in forty varied patterns are produced on both sheets and rolled stock by the company, the Carnivale Line, Highland Park, Ill.

With embossed aluminum, the producers believe, the skilled touch of the metal-working artisan is no longer limited to an individual piece. It can be incorporated at almost negligible cost with this process.

Extensive Market Seen

Carnivale believes that the market for this decorative product is extensive. They believe many uses will be found for the colorful aluminum by architects, decorators, designers and manufacturers as wall-tiles, grillework, "do-it-yourself" products, etc. One particular application was in a church. An entire wall was paneled using four shades of gold in four different pat-



Typical room scene shows some of almost endless applications.

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 117. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

terns. The effect was similar to stained glass—except for being achieved in aluminum.

Variety of other uses to which the material can be put, the manufacturer feels, is limited only by the imagination of the designer.

Waste:

Effective waste treatment Setup combats pollution

An efficient setup for treating mill scale wastes from roughing and finishing mills is in operation at a major steel plant.

Heavy and fine mill scales, oil and grease have been removed from all the roughing and finishing mill wastes at the Middletown, Ohio plant of Armco Steel Corp. since Aug. 1955.

Local River Unpolluted

They have removed a very sizable pollution load from the local river, and are producing acceptable water for re-use on the mills and as replacement for well water on certain processing units.

The treatment program was carried out in two steps over several years. The first step involved treatment of the waste waters from the roughing stands and the 1000 lb sprays ahead of the finishing stands.

Older Equipment Obsolete

After considerable testing and study, company engineers designed a sedimentation basin with mechanical collectors for the removal of scale. Oil removal equipment also was designed. These facilities replaced older and obsolete equipment which became inefficient through several increases in production and enlargements of the mill.

In the past three years during which the new sedimentation basin has been in operation, approximately 145,000 lb of scale per day have been removed from the basin. No attempt was made to re-use the clarified effluent from this installation.

The second step, treatment of the fine scale wastes from the fin-

ANGLE TOOLS?

BUCKEYE builds all types!

DRILLS

90° Heavy-Duty

360° Heavy-Duty

90° Close-Coupled

30° Collet



NEW
90° angle head nutrunners, reversible. Standard head illustrated; also available with short coupled head.

30° Chuck

SCREWDRIVERS

90° Chuck



NEW
Short-coupled drills, screwdrivers, nutrunners, designed for working in areas where operating room is extremely limited.

90° Collet

NUTRUNNERS

90° Reversible

There's a Buckeye angle tool for every drilling and fastening job—including yours. No matter how special your requirements, you're sure to find a Buckeye angle tool exactly suited to your work. Choose from almost 500 types, models and speeds—all described in our Catalog A-10.

Buckeye Tools CORPORATION
DIVISION 11 • DAYTON 1, OHIO

producers of the world's first successful rotary air tools

STOCK HOUSE OR HIGH LINE

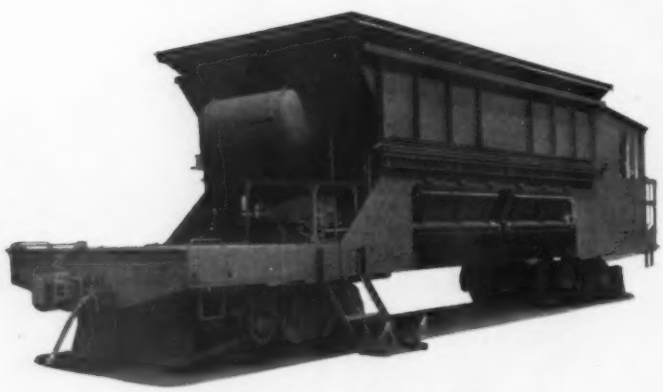
operators prefer the

DEPENDABILITY of ATLAS CARS

These specially designed units are another example of the ruggedness of Atlas Cars. Their dependability helps maintain the most rigid furnace charging cycles.



40-TON SCALE CAR
Double Hopper Bottom Dump



75-TON ORE TRANSFER
Gable Bottom Double Side Dump

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS
1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

ishing stands, was complicated by the fact that chemical coagulants were required to aid the separation process.

Pilot Setup

A preliminary study of the problems presented in treating the very fine scale wastes from the finishing stands led to a very complete pilot plant setup being made at the Butler, Pa., works. Here, over a period of 2½ years, pilot plant work was carried on using various coagulants and different types of equipment.

They were able to determine the best chemical coagulants, their dosage and requirements for best flocculation, types of flocculation and clarification equipment required, means of sludge disposal and all necessary design data for treating this type of wastes.

Pump Station Included

Equipment installed for the treatment of the fine scale wastes included a pumping station with a sedimentation basin effluent well and a clarified water well; chemical mix tank; two flocculation tanks; and two clarifiers. In addition, complete chemical storage and preparation facilities are provided.

Ferric sulfate is used as a coagulant. Heavy sludge is removed to rotary vacuum filters located nearby for drying.

The average flow through the entire system during mill operations is at the rate of 11,500 gpm. Scale removal is at the rate of anywhere from 176,000 to 206,000 lb per day.

River Water Added

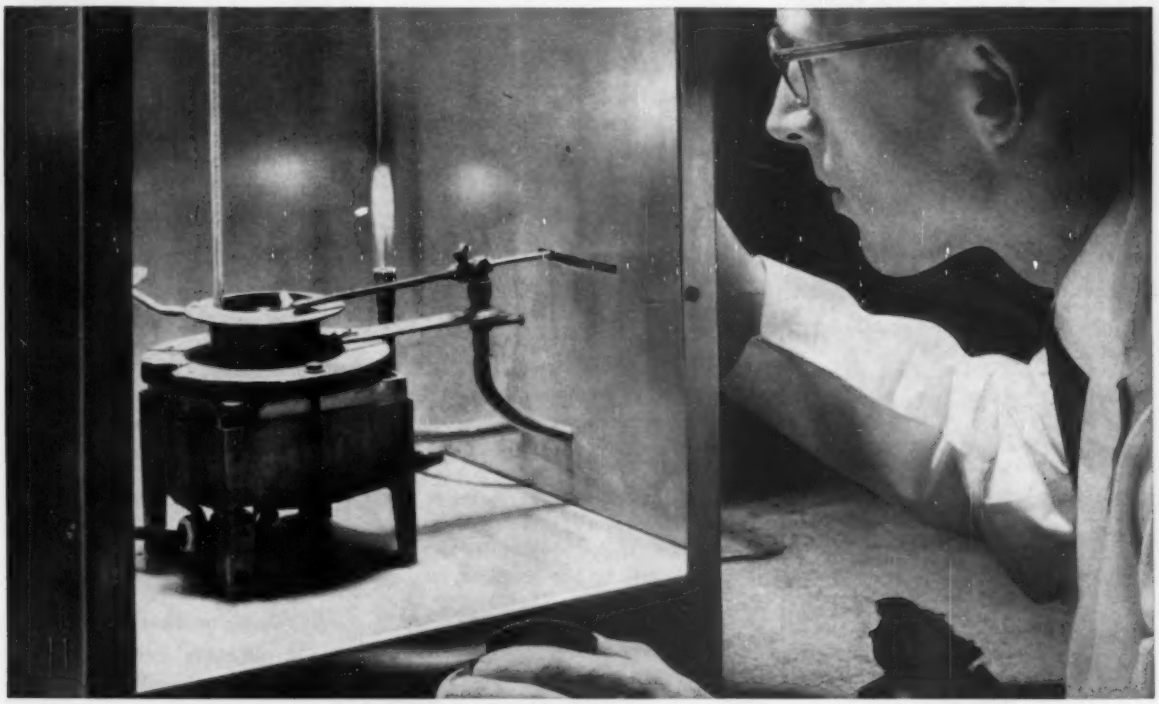
Approximately 2000 gal of river water are added to the system per minute to take care of the drawoff of clarified water used in the processing departments in place of well water and evaporation losses on the mill. This has cut well water pumpage to a great extent.

Very little difficulty has been experienced in the operation of this equipment, the company reports. Maintenance has been at a minimum, they state.

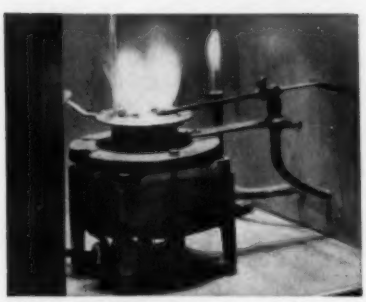


Dow . . . industry's most complete line of chlorinated solvents

DOW



CHLOROTHENE has no flash or fire point as tested by the Cleveland Open Cup Method.



Many petroleum solvents commonly used for cold cleaning have *low* fire and flash points, and present a hazard in plants.

Hold flash and fire dangers to new lows with safer, stable CHLOROTHENE

Both all-around-the-shop and highly specialized cold solvent needs can be met more *safely! How?* By using versatile CHLOROTHENE*, the most efficient, fastest-working cold degreasing solvent you'll find in a month of Sundays. *Why?* Take another look at the pictures on this page; CHLOROTHENE has *no* flash or fire point.

What is it? CHLOROTHENE is Dow Inhibited 1, 1, 1-Trichloroethane. *Who* can use it? Any shop that cleans by spray, dip, wipe or bucket methods. Because CHLOROTHENE has low corrosive effects, it can be used with any common metal.

When can your Purchasing Department get this proved safety solvent? Right now! *Where?* Why, from your regular Dow distributor. He's no doubt already supplying you with such other stabilized, special-use solvents as DOW TRICHLOROETHYLENE, PERCHLOROETHYLENE and METHYLENE CHLORIDE. For more detailed information on any or all of these superior solvents, please return coupon to THE DOW CHEMICAL COMPANY, Midland, Michigan. **Trademark*

THE DOW CHEMICAL COMPANY, Dept. S-947A, Midland, Michigan

☐ Send technical information on your solvent_____

☐ Who is my local Dow distributor for these solvents?

MY NAME_____ TITLE_____

COMPANY_____ ADDRESS_____

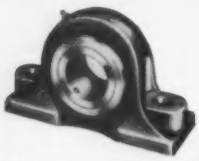
CITY_____ ZONE____ STATE_____

you can depend on DOW SOLVENTS

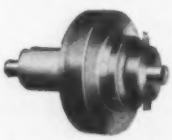
DOW

DODGE PRODUCTS you should know

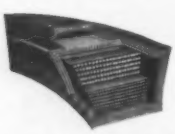




SC and SCM
BALL BEARING
PILLOW BLOCKS



DIAMOND D
CLUTCHES



SEALED-LIFE V-BELTS

DODGE BULLETINS YOU SHOULD HAVE

1 ROLLING BEARINGS. Load ratings, dimensions and other data on Dodge-Timken and SC and SCM Ball Bearings. Bulletin A638.

1 CLUTCHES. Diamond D, Rolling Grip and Air-Grip Clutches. Technical data, sizes and selection tables. Bulletin D56.

1 SEALED-LIFE V-BELTS. Construction details and complete data on sizes, pitch lengths and outside lengths. Bulletin A606.

Write for your copies.

DODGE MANUFACTURING CORPORATION
800 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

Machining:

Drill press fills-in for milling machine

Inexpensive drill press fills in for costly milling machines or internal grinders during short run chamfering operations at International Harvester's Chicago Tractor Works.

Bases of internal splines require a 45° chamfer cut with sufficient precision to avoid stress concentrations. A simple setup enables the plant to substitute a standard 14-in. Delta drill press for more complicated equipment or less precise portable tools.

End Mill Has 45° Angle

The cut is made by an end mill with a 45° angle. Work is held on a sliding plate by the operator, who controls vertical feed of the drill



Work is held on a sliding plate by the machine operator.

press with a foot lever. After the spindle is lowered, the operator slides the plate, bringing the spline into contact with the cutter.

Depth of cut is controlled by one manual setting and visual inspection. The sliding plate gives the operator more precise control than if he pushed the piece over a stationary plate.

Hand Rotation

Rotation from tooth to tooth is done by hand while the tool is chamfering. International Harvester has found that an operator can maintain output with satisfactory precision after little training.

Although a milling machine or internal grinder might do the work more rapidly, special fixtures and setup time make such an operation uneconomic for short runs. Alternatives to using the end mill in the Delta drill press were small grinders or similar hand-held tools.

Some Disadvantages

However, experience has shown that these tools produce less precise chamfers and sometimes notch the work, especially when the operator becomes tired.

Notches must be avoided because they are likely to cause stress concentrations, resulting in fractures during heat treatment or in service.

Materials:

Synthetic rubber compound is odorless and tasteless.

A new synthetic rubber material has passed the odorless and tasteless tests. Made by Goshen Rubber Co., Inc., Goshen, Ind., it is nontoxic, and suited for use in temperatures from –30°F to 225°F. The material is available for fabrication to customer specification into seals and parts.

Research:

Small melting furnace speeds tube research

A 50-pound electric melting furnace for use in the development of experimental tubing analyses is in operation at Superior Tube Company, Norristown, Pa.

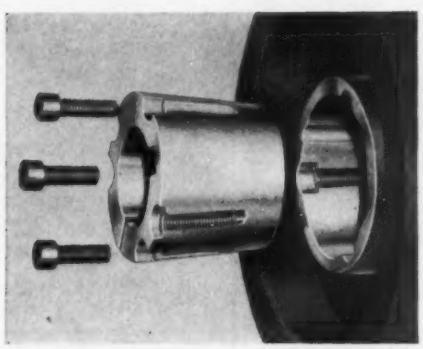
Custom Melting Done

Used as a research tool the furnace melts alloys to specifications submitted either by customers or the company's technical department. The small cast billets are then turned, drilled and cold drawn into small diameter tubing for evaluation of physical, mechanical and chemical properties.

The experimental melts from the furnace are used for developing

68

LEADING MANUFACTURERS ARE LICENSED BY DODGE TO MANUFACTURE TAPER-LOCK HUBS FOR USE IN THEIR PRODUCTS OR PLANTS



TAPER-LOCK

The Taper-Lock method of mounting wheels to shafts has been adopted as standard in thousands of plants. With 68 licensees incorporating Taper-Lock in their products, such standardization is becoming more and more universal . . .The Taper-Lock bushing mounts flush. No flange, no collar, no protruding parts. Easy on, easy off. Taper-Lock holds with the firmness of a shrunk-on fit. ONE bushing fits sprockets, sheaves, couplings and pulleys—both timing-belt and conveyor . . . See your Dodge Distributor or write us for the full story.

DODGE MANUFACTURING CORPORATION
800 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

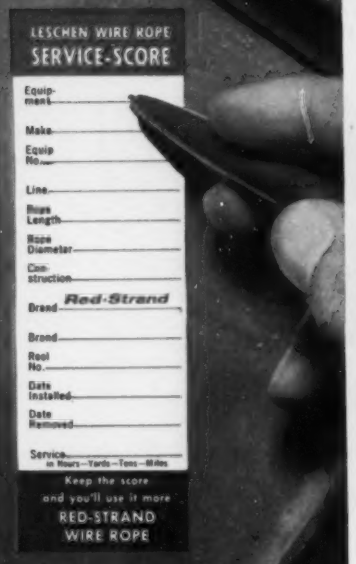
MANUFACTURER OF MODERN POWER TRANSMISSION MACHINERY AND ORIGINATOR OF TAPER-LOCK

TAPER-LOCK LICENSEES

The Air Preheater Corp., New York
Ajax Flexible Coupling Co., Inc., Westfield
American Can Co., Pacific Div., San Francisco
American Machine and Metals, Inc., East Moline
Sub. Cos. Bethlehem Steel Corp., Bethlehem
The Black-Clawson Co., Middletown
The Brewster Co., Inc., Shreveport
Chain Belt Company, Milwaukee
Chicago Pneumatic Tool Co., New York
The Cleveland Worm & Gear Co., Cleveland
Cocker Machine & Foundry Company, Gastonia
Colmant-Cuvelier, Lille, France
Continental Can Co., Inc., New York
Crucible Steel Co. of America, Pittsburgh
Dexter Folder Company, Pearl River
Diamond Chain Co., Inc., Indianapolis
The Duraloy Company, Scottdale
Ericsson Merritt, Inc., Lockport
Fairmont Railway Motors, Inc., Fairmont
J. H. Fenner & Co., Ltd., Marfleet, England
J. H. Fletcher & Co., Huntington
Foremost Machine Builders, Livingston
The Fuller Brush Co., Hartford
The Goodman Mfg. Co., Chicago
Gould Paper Co., Lyons Falls
Hammond Laundry Cleaning Mach. Co., Waco
Hetherington and Berner Inc., Indianapolis
Humphrey and Sons Co., Joliet
Illinois Gear & Machine Co., Chicago
Imperial Paper and Color Corp., Glens Falls
Industrial Specialties Co., Pawtucket
Iowa Manufacturing Co., Cedar Rapids
The Jeffrey Manufacturing Co., Columbus
Jones Machinery Division, Hewitt-Robins Inc., Chicago
Kelley Gear Works, Inc., Bridgeport
The Karl Kiefer Machine Co., Cincinnati
Keyes Fibre Company, Waterville
Lamson Corporation, Syracuse
E. P. Lawson Co., Inc., New York
Link-Belt Company, Chicago
The Long Company, Oak Hill
Loper Machine Works, Monroe
Lovejoy Flexible Coupling Co., Chicago
J. W. Minder Chain & Gear Co., Los Angeles
Morse Chain Company, Detroit
Niagara Chemical Division, Food Machinery & Chemical Corp., Middleport
Oil Well Supply Division, United States Steel Corp., Dallas
Porter-Way Harvester Manufacturer, Waterloo
Potter & Johnston Co., Pawtucket
Prager Incorporated, New Orleans
Proctor & Schwartz, Inc., Philadelphia
Ramsey Chain Company, Inc., Albany
Robert Reiner, Inc., Weehawken
R. J. Reynolds Tobacco Co., Winston-Salem
St. Regis Paper Company, New York
Shenango-Penn Mold Co., Dover
Sonntag Scientific Corporation, Greenwich
Standard Steel Spring Div., New Castle
Stranahan Gear Co., Inc., Philadelphia
M. H. Treadwell Company, Inc., New York
The Union Chain & Mfg., Co., Sandusky
United States Rubber Co., Philadelphia
J. A. Vance Co., Winston-Salem
Warner Electric Brake & Clutch Company, Beloit
The Waterman-Western Company, Exeter
Webster Manufacturing, Inc., Tiffin
Whitewater Manufacturing Co., Whitewater
The Whitney Chain Company, Hartford

Now Leschen Offers

NEW WIRE ROPE Service-Score System



Simple plan tests wire rope performance and costs—shows comparative values—helps reduce operating expenses—speeds reordering.

Leschen's quick-fact-finding Service-Score System utilizes easily applied, easily removed pressure sensitive stickers, which record equipment and rope data, dates of rope installation and removal.

What is your *true* wire rope cost? Do you know? Are you using the right rope type or construction? The right brand?

Questions like these are readily answered with Leschen's new Wire Rope Service-Score System. Service-Score stickers report performance—type versus type, brand versus brand. Performance facts reveal costs and help *cut costs.*

Service-Score stickers provide easily-available, *helpful reordering data*—wire rope diameter, length, construction, date installed, and date removed.

Service-Score stickers remind operators when it's time to replace rope—*increasing safety* margins.

Service-Score records enable you to check and compare wire rope types and constructions. For example, you find for yourself, as others have, that Red-Strand consistently scores high. You learn the advantages of super-strength Porter Imperial Red-Strand, or Hercules Flattened Strand.

Write for sample stickers. Or see your nearby Leschen Wire Rope distributor.

LESCHEN Red-Strand WIRE ROPE

A DIVISION OF H. K. PORTER COMPANY, INC. HKP

Keep the score and you'll use it more Red-Strand Wire Rope

LESCHEN WIRE ROPE DIVISION
H. K. PORTER COMPANY, INC.
St. Louis 12, Missouri

new cathode materials, or for tubing for other applications.

In the development of experimental tubing analyses, the new facility saves valuable time by permitting the company to produce immediately its own raw stock without waiting for supplies from an outside source.



A small melt is poured for later use as a cathode material.

Firm Searches, Researches

Superior is constantly searching for new materials for its line of precision drawn small tubing. Currently it offers 63 standard and 58 special analyses in carbon, alloy and stainless steels; nickel and nickel alloys; titanium, zirconium and zirconium alloys; copper and copper base alloys; glass sealing alloys and nickel cathode materials.

Materials:

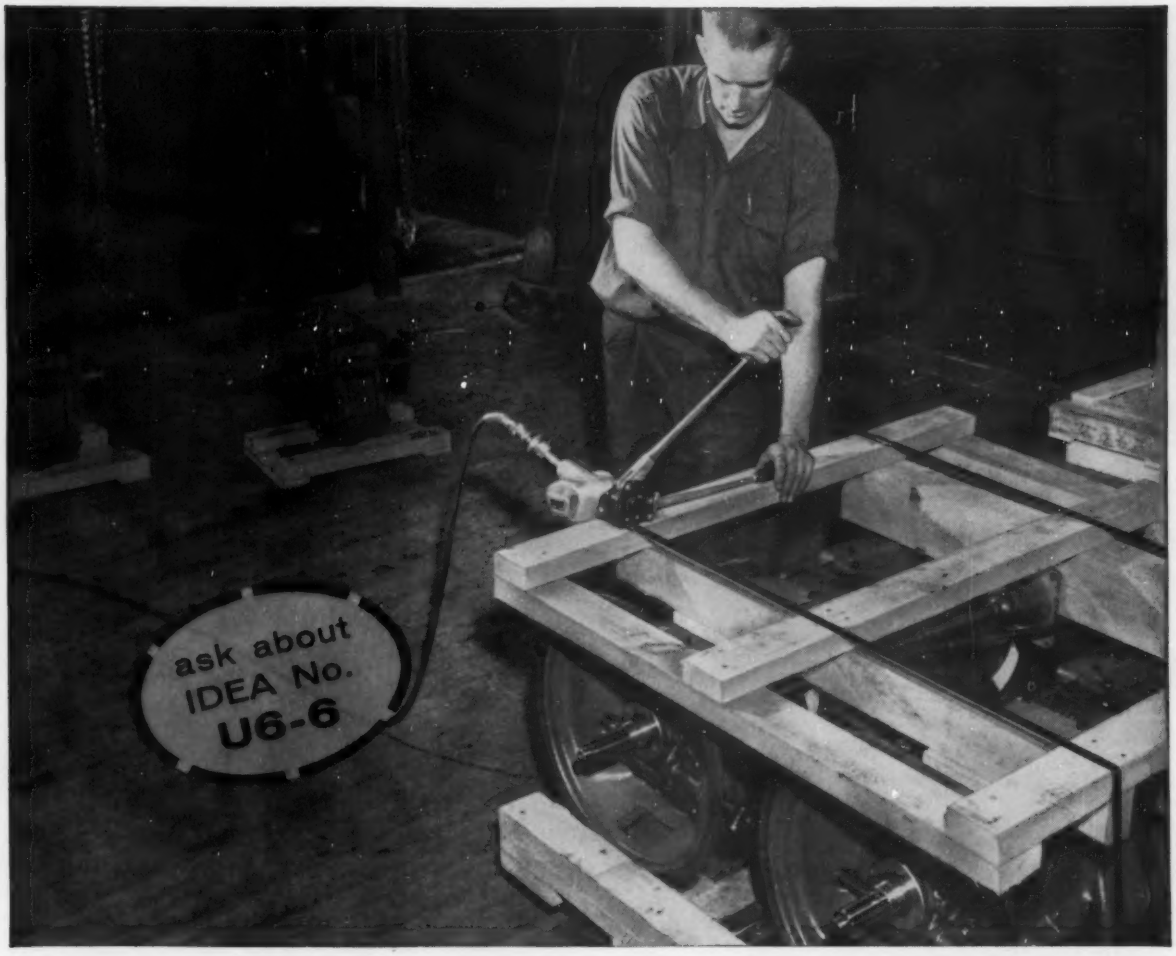
Special-purpose fluid is fire-resistant

A new fire-resistant hydraulic fluid is being compounded expressly for systems operating at temperatures above 150°F and for heavily loaded pumps and bearings. Its developer is E. F. Houghton & Co., Phila.

Fortified Synthetic

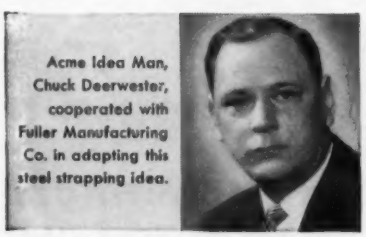
This new fortified fluid is a companion to a fluid pioneered by the company five years ago. The original fluid is a water-base material.

The new fluid is a fortified synthetic material. It is designed for



Check your AIM*. . . Fuller Manufacturing Company did . . .

Strapping transmissions saves money, speeds handling



Acme Idea Man, Chuck Deerwester, cooperated with Fuller Manufacturing Co. in adapting this steel strapping idea.

ACME STEEL STRAPPING helped Fuller Manufacturing Company, Kalamazoo, Michigan, eliminate costly crating and slow manual handling. Now, two transmissions are steel strapped to a wooden skid, with protective top frame. This is accomplished in half the time previously required for the crating operation by the same crew. (Idea No. U6-6)

The steel strapped skid loads are moved by lift-truck, can be stacked six high. Appreciable saving in material cost and storage space are realized. And, damage in transit is reduced.

***Check your Acme Idea Man.** He will show you examples of Ideas-In-Action which are being used to solve all types of packing and shipping problems. Write Dept. IFU-106, Acme Steel Products Division, Acme Steel Company, 2840 Archer Avenue, Chicago 8, Illinois. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Avenue, Toronto 13, Ontario.

ACME STEEL STRAPPING

systems which run hot, 150°F. and above, and for heavily loaded pumps and bearings. In addition to greater film strength and lubricity this new fluid is fortified with rust preventives and antifoaming agents. It is designed only for systems where high operating temperatures and heavily loaded pumps and bearings call for specially compounded fire-resistant fluids.

Machining:

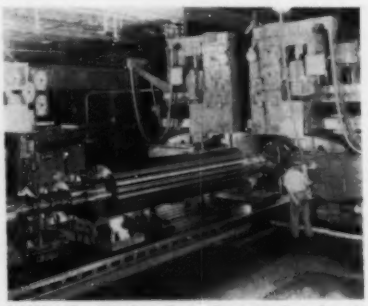
Giant miller machines turbine rotor

One of the largest milling machines in the country is currently machining a huge turbine-generator rotor.

This machine has four 75-hp heads, a maximum overall width of 28-ft, maximum height above floor line of 18-ft, 6-in., and maximum overall length of 102-ft. The table is 84-in. wide, 56-ft long and has a carrying capacity of 175-ton. The miller is described as the largest special design adjustable rail milling machine in the country.

Split Table Arrangement

The machine can be used as a conventional four-head planer type milling machine as well as for special rotor slotting work. It is equipped with a split table arrangement permitting set-up on one portion of the table while the other part is in use. The miller is fixtured with an index mechanism that operates on the air electric principle.



Miller's 75-hp heads work giant turbine rotor piece.

For 175,500-kw Generator

The rotor is under construction for one of two generators in a 300,000-kw steam turbine-generator. The generator is being built for the River Rouge plant of the Detroit Edison Co. at Allis-Chalmers' West Allis Works. The generator for which this rotor is being built will be rated 175,500 kw, 18,000 volts, 3600 rpm.

Fastenings:

Now you can tell a bolt by its color

Whether "You Can't Tell A Book By Its Cover" or not is debatable. However, now you can tell a fastener by its color. Nylok-Detroit Corp., Birmingham, Mich., has adopted a special color for the nylon pellet permanently inserted

A STAMPING JOB . . . Well Done! . . . for NIKOR



This attractive all-stainless steel film developing tank made by Nikor Products Co., West Springfield, Mass., has skyrocketed into popular demand among amateur and professional photographers because of its sturdy, life-time construction and fool-proof performance.

Precision forming of these pieces—tank, cover and cap—provides an excellent example of skillful stamping by WSM—since exceptionally close tolerances are essential for water and light-tight assembly. The 5 degree bevel of cap and cover must be just right for a friction closure—in fact, each part must be a perfect fit for protection in daylight use.

Nikor recognized that WSM had the technical experience and metalworking knowledge to establish these high standards . . . and to maintain this reputation for Nikor quality.

You too, can benefit from WSM engineering accomplishments in tool design and stamping production—to shape workable metals into component parts with the greatest economy. Let us help you with your product problems.

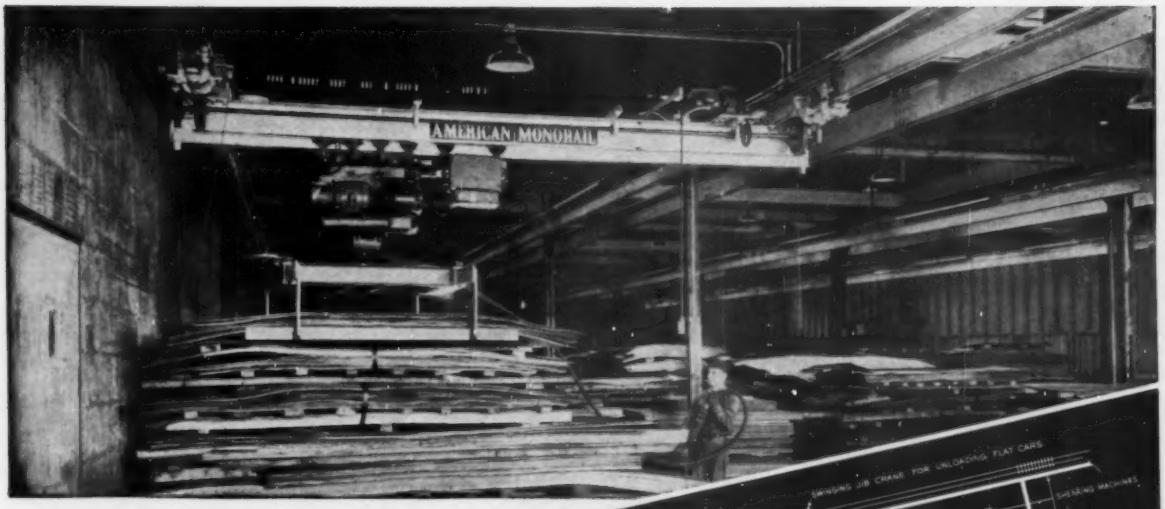
A WSM representative will be glad to call on your request.

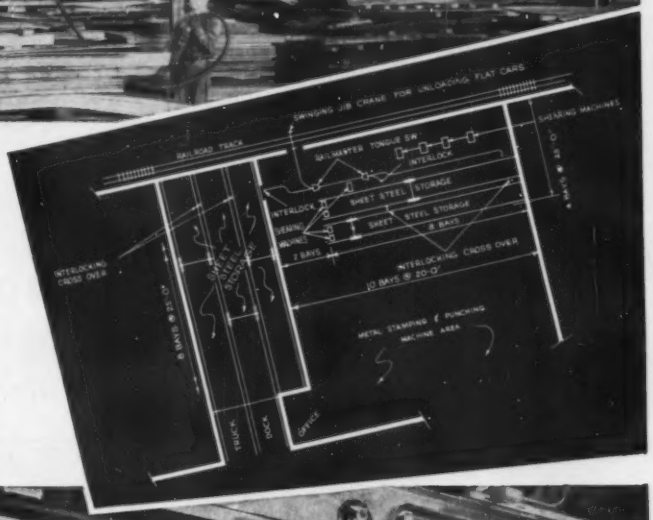
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WORCESTER STAMPED METAL Company

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SPECIALISTS IN SKILLED STAMPING SERVICE





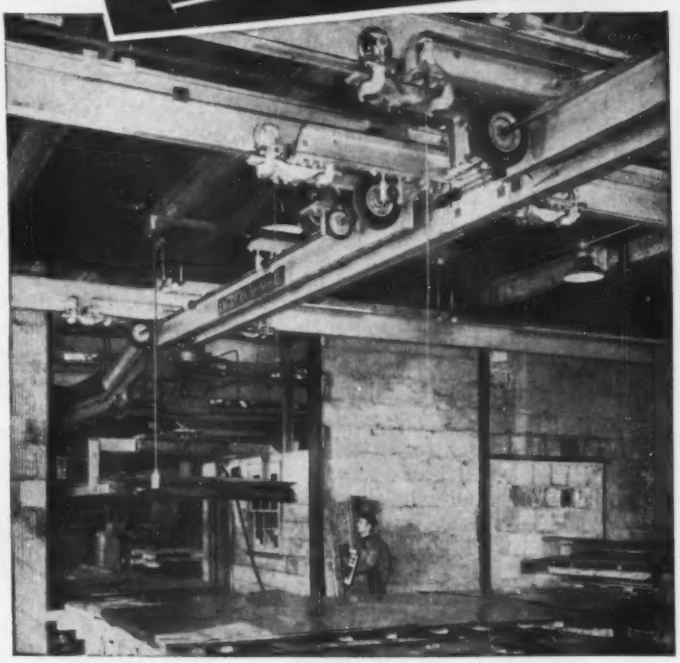
handles 200 tons more steel per day with AMERICAN MONORAIL

The Hamilton Steel Products Company of Chicago now handles 250 tons of sheet steel per day with American MonoRail cranes as compared to 50 tons by previous methods. An increase of 400%.

This is just another example of cost savings with improved handling methods which are regularly realized by American MonoRail users. If you have a materials handling problem call your American MonoRail representative or write us today.

Send for Bulletin SC-1.

Member of Materials Handling Institute and MonoRail Association

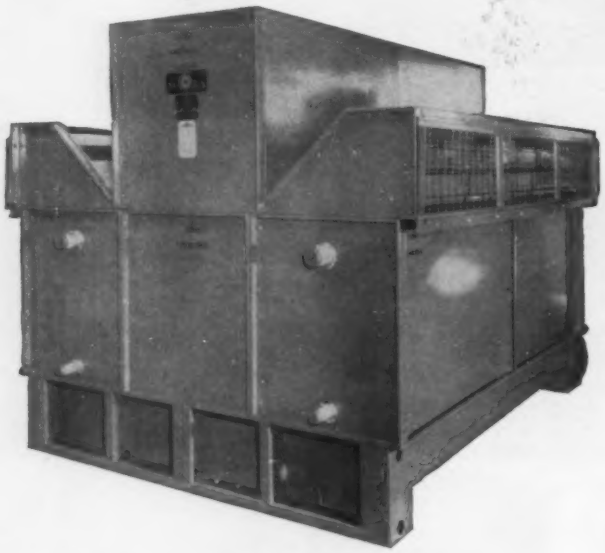


AMERICAN OVERHEAD HANDLING EQUIPMENT

MONORAIL COMPANY

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NIAGARA SECTIONAL
***Aero* HEAT EXCHANGER**

gives close temperature control,
saves you ***LABOR,*** *Power, Water*

- **Because the new design improves the heat transfer to the out-door air by evaporation.**
- **Because new features keep your equipment working for long life with "new plant" efficiency...always full capacity.**
- **Because you save 95% of cooling water cost.**

You get faster, more accurate cooling of industrial fluids to specified temperatures.

You improve your quality of production by removing heat at the rate of input.

You save labor in upkeep. With full access to all interior parts and piping you see everything in easy inspections. You head off dirt accumulation and corrosion. Casing panels are removable without moving the coils. The coils can be cleaned from both sides.

First cost is low; freight is low because of the lowest space/weight ratio; you save much labor in erection. Capacity range is 7,000,000 to 18,000,000 Btu/hr. No other heat exchange method gives you so much saving in money and convenience.

Write for Niagara Bulletin 132. Ask for the full story of how you can save expense in your plant and improve your product's quality.



NIAGARA BLOWER COMPANY
Dept. I-A, 405 Lexington Avenue
NEW YORK 17, N. Y.
District Engineers in Principal Cities

NIAGARA — *Over 40 Years' Service in Industrial Air Engineering*

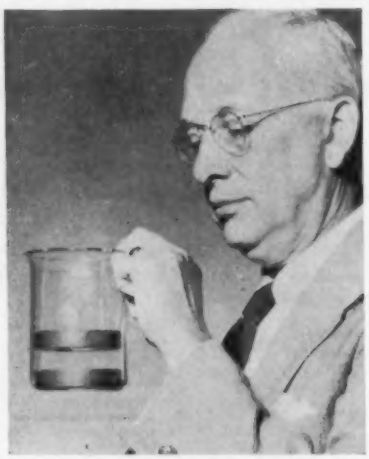
in its self-locking threaded fasteners. The color, yellow, serves as a quick, positive means of identifying all the company's screws, bolts and other standard and special threaded parts. The permanent coloring agent is neither an ink nor a dye.

Ceramics:

Magnetic material is almost impossible to demagnetize

Non - metallic and electrically non - conductive, a new ceramic material can be permanently magnetized to hold its strength under the most adverse conditions.

The new magnetic ceramic is produced without critical materials such as cobalt, nickel or other metals which are costly and, in times of emergency, are often unobtainable. Tabbed Ferroxdure by



Pair of magnets repel each other inside laboratory jar.

its developers, North American Philips Co., Inc., New York, it is unaffected by external fields and is practically impossible to demagnetize once it has been polarized. Since it can be molded into various shapes, the new material has many practical advantages. Compared with metal ones, Ferroxdure magnets are smaller in size, lighter in weight, have longer effective life, and provide improved performance and cost savings.

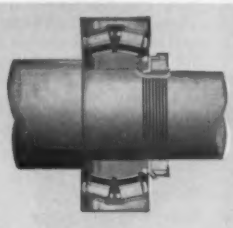
MORE FACTS on why more and more leading manufacturers choose Link-Belt bearings



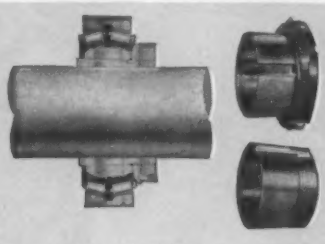
ALLIS-CHALMERS MOTOR GRADER capitalizes on the ability of Link-Belt self-aligning roller bearings to handle high shock loads.



FREE-ROLLING — SELF-ALIGNING. Spherical inner ring is free to align in any direction. Load is distributed over entire roller assuring full load capacity. Destructive edge loading cannot occur.



DIRECT SHAFT MOUNTING with bearing being pressed or shrunk on the shaft. Especially desirable to achieve maximum economy on production applications.



ADAPTER MOUNTING permits use of commercial shafting without machining. Easy installation and removal of adapter-type bearings are provided by the tapered sleeve, locknut and lockwasher.

Builders of industry's heaviest equipment

choose this self-aligning roller bearing for toughest applications

You're in company with blue-chip machinery makers when you specify high-capacity Link-Belt self-aligning roller bearings. Wherever tough-duty equipment calls for self-contained, pre-adjusted bearings and simple mounting, you'll find them on the job . . . handling heavy radial and thrust shock loads.

These self-aligning roller bearings have internationally standardized boundary dimensions and are available everywhere. Link-Belt also makes industry's most complete line of ball and roller bearing blocks. This includes pillow blocks plus flange, flange cartridge, cartridge, take-up and hanger blocks. Ask any one of the 40 Link-Belt offices for data Book 2550 or an authorized stock-carrying distributor.

LINK-BELT

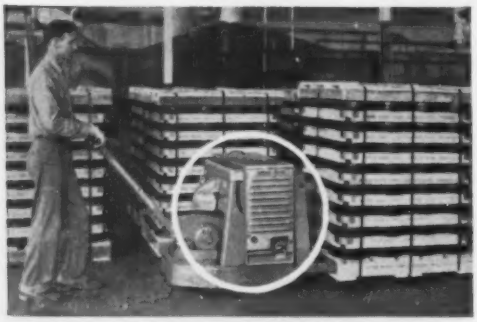
Ball and Roller Bearings



Bearing boundary dimensions are international standards for Series 22200 and 22300—22500-A and 22600-A.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

Get the Advantages of READY-POWER on Your Electric Industrial Trucks



Get Live Power for Walkie Trucks

Ready-Power's popular bantam model "W" is equipped with dependable 12-volt automotive-type starting and ignition. Variety of idling speeds and easy accessibility make it ideal for all walkie trucks as well as rider trucks up to 2,000 lbs.



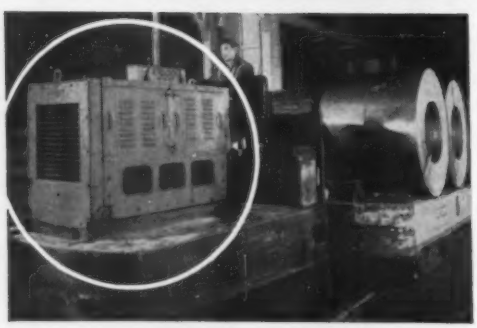
Work Your Fork, Platform, Tractor Trucks 'Round the Clock

Ready-Power gas-electric and LPG-electric units give materials handling trucks continuous, full power all the time. Slowdowns due to power fatigue are eliminated. The simple, all-electric control and live response make Ready-Power-equipped trucks rate high with truck operators.



Energize Lift Magnets on Your Electric Trucks

In the application shown at the left, the Ready-Power unit not only powers the truck, but also energizes the lift magnet for handling scrap metal. Ready-Power units are removable for shop adjustment while a spare keeps trucks working.



Get Diesel Electric for Lowest Ton-Mile Costs

Take a tip from the owners of industry's biggest trucks . . . power them with Ready-Power diesel-electric for maximum stamina, dependability, and lowest operating costs. Ready-Power offers power for every size and make of electric truck.

Your Truck is No Better than its Power . . . Write for Information on Ready-Power gas-electric, LPG-electric, and Diesel-electric Units

READY-POWER

The READY-POWER Co., 3822 GRAND RIVER AVE., DETROIT 8, MICH.

Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

Machining:

Automatic skin trimming speeds panel production

Automatic skin trimming is the latest tooling development at the Martin Co., Baltimore. The trimming method was first employed in production of panels and trailing edges of the B-57 bomber. It has now become a widely accepted tool and will be used on future models.



B-57 bomber's trailing edges are trimmed with the new device.

The process involves the use of a trim fixture to hold the panel to the scribe line and a router which trims the panels as per their position in the fixture.

Prior to this development, the lengthy panels were scribed and cut necessitating a subsequent manual filing operation to the scribe line. This method was found to be time-consuming and uneconomical.

Evolution of this method of automatic trimming has cut working time an estimated 60 pct resulting in an increased saving.

The tool has now become universal and more tools of this type are being planned to be used on future aircraft models.

Research:

Electricity obtained from gas with fuel cell

Electricity is now being obtained from gases such as oxygen and hy-

Another Modern Plant by **AMERICAN BRIDGE**





METAL STAMPING PLANT

FISHER BODY DIVISION

GENERAL MOTORS CORPORATION

NEAR MARION, INDIANA

One of the largest industrial projects undertaken in this country in recent months is nearing completion on schedule. It is the vast new metal fabricating plant for the Fisher Body Division of General Motors, located near Marion, Indiana.

All of the 32,050 tons of structural steel that went into this big project was fabricated and erected by the American Bridge Division of United States Steel. The various integrated buildings and related structures comprising the modern plant include:

PRESS SHOP—about 440′ x 1128′—consisting of one transept crane aisle, 120′ x 1128′, and fourteen Press Pit Crane Bays, 80′ x 440′.

METAL SHOP—about 563′ x 1128′—plus Shipping Dock and Future Craneways, 123′ x 964′.

PRESS PIT GIRDERS—for an area about 260′ x 960′ (249,600 sq. ft.) and **PRESS PIT FLOOR FRAMING** for the same area.

BALER HOUSE—78′ x 120′ x 58′1¾″ high.

BOILER HOUSE and PIPE TRESTLE.

YARD CRANE RUNWAY—60′ span x 166′ long x 29′ high, supported on A-frame bents.

INDUSTRIAL WASTE TREATMENT PLANT BUILDING—32′3″ x 36′6″ x 19′8″ high, with mezzanine floor 10′ x 19′.

All field connections were made with either high tensile or ordinary bolts.

If you would like to know more about the advantages of having American Bridge handle the structural steelwork for your expanding industrial facilities, just contact the nearest office. Or an inquiry direct to our Pittsburgh headquarters will bring full information.

GM
GENERAL MOTORS

General Contractor for Project:

Huber, Hunt & Nichols, Inc.
Indianapolis
and
Ragnar Benson, Inc., Chicago
(a joint venture)

• • •

Designs By:

Argonaut Realty Division
General Motors Corporation

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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

AMERICAN BRIDGE

USS

UNITED STATES STEEL

America's oldest, leading shear

the most in accuracy, speed



NIAGARA

POWER SQUARING SHEARS

builder offers you

and thrifty performance

One of the greatest values of a Niagara Power Squaring Shear is the unequaled experience of its builder. Niagara has been making shears for more than three quarters of a century.

Today, as in the past, the oldest leading name in shears stands also for the most modern in shear design. Niagara has continually set the pace in offering the most of **things which count the most** in dependable shear performance.

YOU GET THE MOST IN ACCURACY:

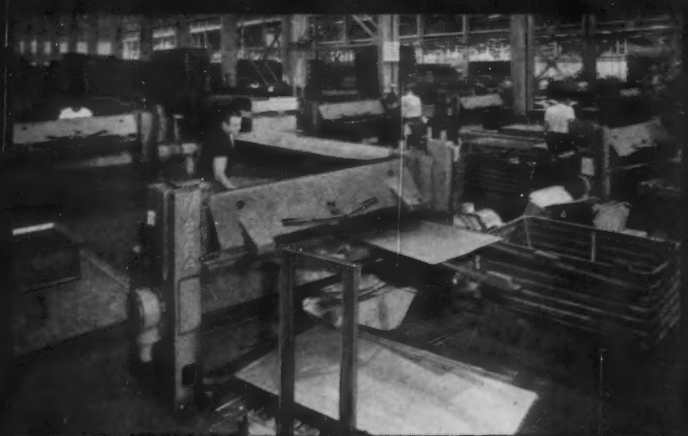
- With the cutting line fully visible, the positive power actuated, self-compensating holddown grips work securely. Multiple pressure feet on 6" centers apply uniform pressure, contacting the work with low impact to safeguard material and bed against damage. Long or short work is held tight against the bed. There's no rippling of the sheet as the keen edged, low-sloped upper knife shears through . . . clean and smooth.
- Niagara's fully closed box section construction of bed, crosshead, holddown and housings plus ample and accurately held crosshead guides resist horizontal, vertical and torsional stresses with minimum deflection.
- Edges are trimmed straight and true within micrometer tolerances. Blanks, too, are cut accurately to size and shape without making compensating allowances when setting gages. Only a Niagara Shear possesses **all** of the necessary features to insure maximum accuracy!

YOU GET THE MOST IN SPEED:

- More working strokes delivered per minute and instant engagement of the Niagara Sleeve Clutch assure more cuts per hour. In continuous feed shearing, quick release of the power driven holddown enables a strip to be cut at each stroke.
- There's no need to adjust knife clearance every time a different thickness of stock is cut. Individual holddown feet are self-compensating. Two sheets of different thicknesses can be cut at the same time with the same knife adjustment and with the same accuracy.
- Ease of operation, quick setting gages and confidence inspired by safety features further increase hourly output . . . and make a Niagara Shear a truly productive, profitable investment for you!

YOU GET THE MOST IN THRIFTY PERFORMANCE:

- Simplicity of design, involving a minimum number of parts, cuts out costly maintenance. With less to go wrong, there's less to repair and replace.
- Vital parts of Niagara's driving mechanism (clutch, gearing, flywheel, eccentrics and detent) operate in enclosed oil-tight cases. Ideal lubrication and maximum safety are thus insured.
- With power transmitted from the drive through efficient spur gears and Niagara's instant engaging, multiple-point sleeve clutch, there are no sliding surfaces (such as in worm gears and friction clutches) to consume power, generate heat and wear rapidly.
- Niagara 4-cutting-edge knives, manufactured entirely within the Niagara plant, are uniformly tough to withstand hard usage and are promptly available.



Niagara Shears at work in Ohio plant of one of the major electrical appliance manufacturers.

MOST EXACTLY SUITED TO YOUR NEEDS, TOO!

To fit your requirements exactly, consult a Niagara representative. With over 7 dozen models available in capacities from shim stock to 1" mild steel and in cutting lengths from 3 to 24 ft., he'll be able to recommend the shear that's **right** for you.

ILLUSTRATED, FACT-FILLED BULLETIN 69 MAILED FREE ON REQUEST

It will give you detailed information on the complete, modern line of Niagara Underdrive Squaring Shears. Write for your copy today.



NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N.Y.

DISTRICT OFFICES

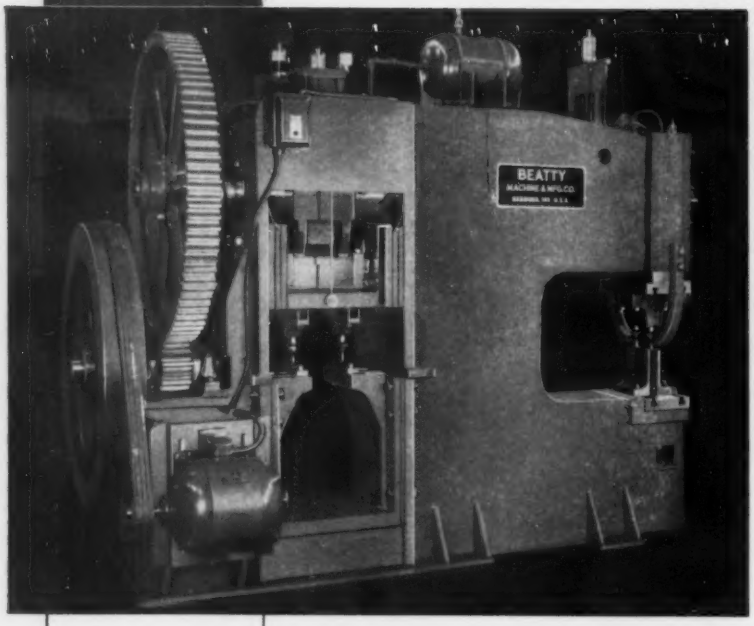
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Dealers in principal U. S. cities and major foreign countries

America's Most Complete Line of Presses, Shears, Press Brakes, Other Machines and Tools for Plate and Sheet Metal Work.

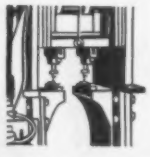
BEATTY
NO. 7 DETAIL BEAM PUNCH

New Detail Beam Punch Speeds Single-Hole Punching





Web Punch End One set single gag punch tools



Flange Punch End Two sets of single gag punch tools

In just three passes, instead of the usual five, this Beatty Detail Beam Punch punches flanges on either side of the webs of beams, as well as webs of beams, angles, channels and plates — eliminates the end-for-end turning of beams.

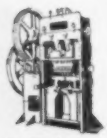
Incorporating an entirely new design that speeds single-hole punching, this compact new punch saves floor space and reduces your equipment investment by handling the work of three ordinary machines. Mechanically driven, it is of 100-ton capacity, open-throat and guillotine type, and will punch up to a 1¼" hole through 1" mild steel.

Write For Full Details

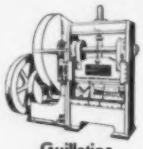


BEATTY
MACHINE & MFG. CO.

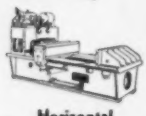
936 150th St.
HAMMOND, IND.



Guillotine Beam (Flange) Punch



Guillotine Bar Shear



Horizontal Hydraulic Bulldozer

drogen by means of a "fuel cell." The gases serve as positive and negative poles, respectively.

The "fuel cell" is presently under development at the new Parma, Ohio, research laboratories of National Carbon Co., a division of Union Carbide & Carbon Corp. In laboratory fuel cell testing, gases flow thorugh tubes into a beaker



Electricity extracted from the gases lights a small bulb.

where carbon plates are immersed in special fluids.

One of the aims of the research program is development of improved fuel cell carbon elements which will last for long periods under relatively high and intense currents.

The small amount of electricity extracted from the gases in present research cells can now only light a small bulb. However, when ultimately developed, the firm hopes commercial fuel cells will be used for reserve or standby power supplies and for submarine propulsion.

Foundry:

Induction stirrer mechanisms produce better castings

Induction stirrer mechanisms, for the first time in the world, are to be employed in a foundry to produce better alloyed steel castings.

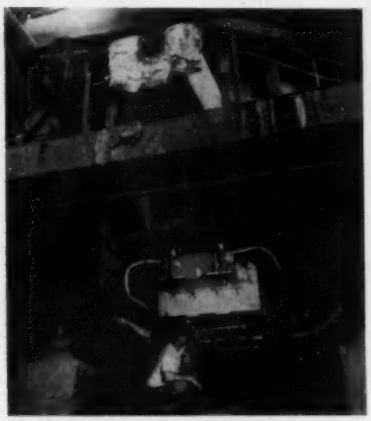
Until now all stirrers employed in the metals trade throughout the world were (and are) used in steel mills for the production of steel ingots. Ingots are, of course, later

converted into useful shapes by rolling or forging techniques.

One of the devices is presently being installed on an electric arc furnace, and another one will soon be placed on a second furnace. Both are located in General Electric's Schenectady steel foundry.

A Swedish invention, induction stirrers decrease time necessary for refining steel prior to pouring. This helps produce a better quality of steel for casting.

In electric arc melting furnaces, static molten metal baths during the refining stage slow down metallurgical reactions. Alloying elements tend to stratify, and temperature distribution is not even. Accurate sampling of the melt is practically impossible in the case of high alloy steels. "Various manual and mechanical methods are presently employed to obtain some mixing and stirring action of the metal and slag, but in most cases the results are not completely effective," says G.E.



Engineer checks stirrer attached to furnace bottom.

The induction stirrer device is a water cooled coil. It resembles a segment of the stator of a large two-phase induction motor. The stirring coils are encased in a steel container, or box. This is curved lengthwise only to fit the furnace contour.

The stirrer coil is suspended approximately one inch below a stainless steel furnace bottom. The flow pattern is achieved by the two-

ORCHARD VPI



prevents rust on Borg-Warner

ENGINEERING B-W PRODUCTION

SHIPMENTS TO EUROPE



Step 1—Transmissions on Skids



Step 2—VPI Cover



Step 3—Waterproof Cover



Step 4—Crated for Shipment

Borg-Warner International Corporation, Chicago, Illinois, ships transmissions to Europe for use in Mercedes-Benz, Jaguar, and other foreign cars. Wrapping and packaging for overseas shipments is done in the four simple steps illustrated. The use of Orchard VPI paper prevents rust and corrosion, and helps provide the complete protection that keeps Borg-Warner transmissions in perfect condition for two years or more.

Orchard VPI paper is scientifically manufactured to give off an invisible vapor that prevents rust on all ferrous metal parts and products. It is economical and easy to use for packaging, for shipping, and for storage. It saves time and delivers parts in a rust-free condition ready for resale or installation. Orchard VPI is available in sheets, rolls, bags and shrouds—all shapes and sizes to fit your needs.

This four-step packaging for Borg-Warner Shipment was designed, engineered, and performed by Jerome F. Gould Corporation, export packers of Brooklyn, New York and Detroit, Michigan. VPI paper was purchased through Mid-West Paper Products Company, Detroit. Mid-West Representatives: R. M. Reutlinger & Assoc., Dayton, Ohio; Protective Packaging Co., Chicago, Illinois.

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phase winding being excited by alternating currents of low frequency.

Low frequency currents in the stirrer are produced by a two-phase generator driven by an induction motor. A traveling magnetic field induces eddy currents in the molten bath of metal. The magnetic field associated with these eddy currents reacts with the excitation field. This creates a stirring force which moves the molten metal in the furnace across the hearth bottom and upward and sideward in conformity to its hemispherical shape.

According to E. R. Oeschger, foundry dept. general manager, the stirring action will produce many beneficial results, both metallurgically and economically. Some of these are: An almost complete removal of such impurities as phosphorous and silicates with very little or no loss of metal; sulfur impurities are reduced to about one-third the best levels attainable with conventional practice; a better control of grain size in austenitic steel because the furnace temperatures will be uniform due to the constant stirring action of the molten metal; final alloy adjustments can be accurately predicted because of the stirring action; chemical stratification is minimized, and sample analyses are representative of the entire heat; refining time is reduced.

Two Electric Arc Furnaces

In the Schenectady Foundry there are two electric arc furnaces. One is a 13.5-ft diam, 50,000 lb capacity furnace. The other is an 11-ft diam, 25,000 lb capacity furnace.

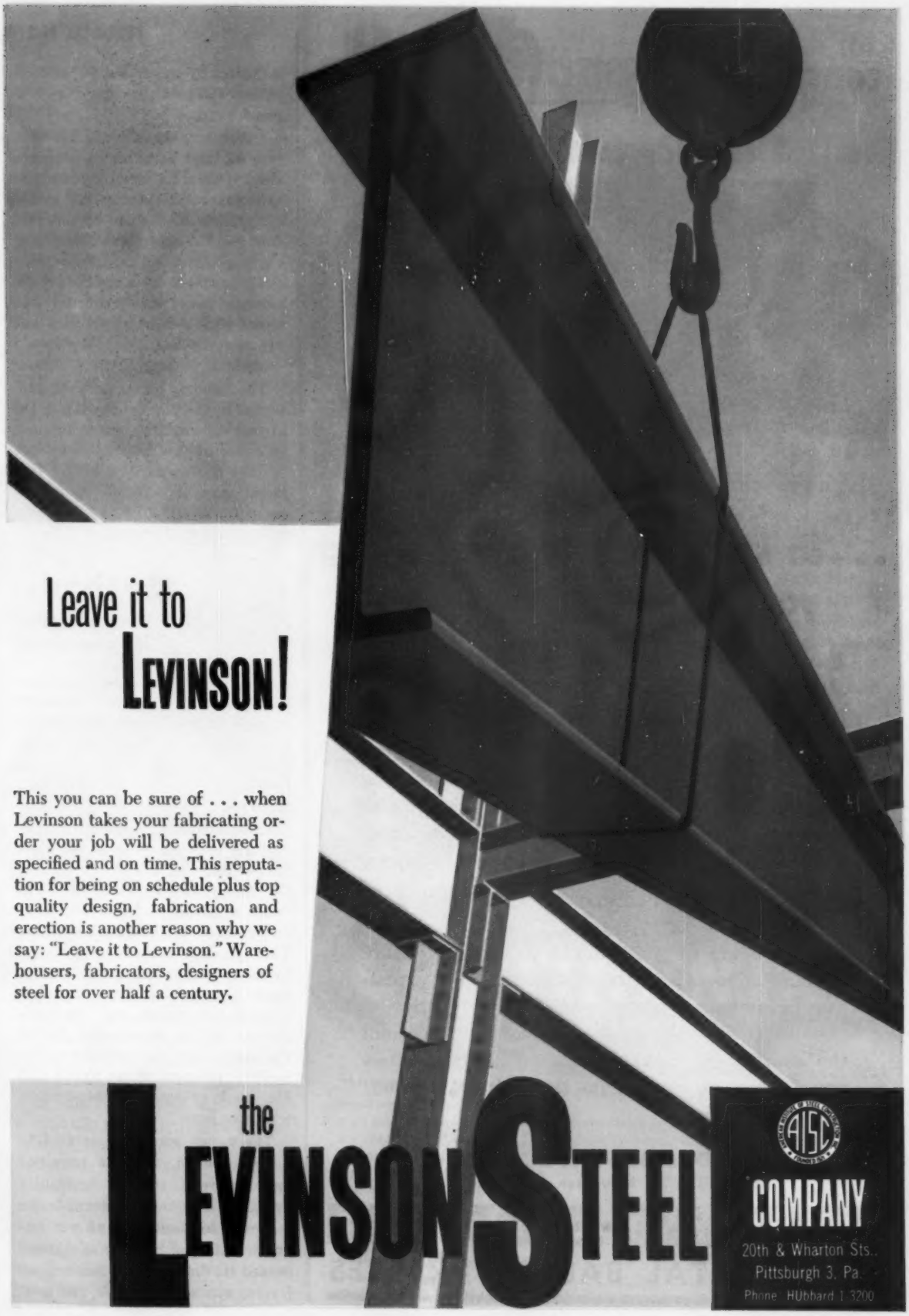
Both furnaces annually produce 13,500 ton of electrically melted steel.

The stirrer assembly, including coils and container, on the 50,000 lb capacity furnace weighs 17,000 lb. On the 25,000 lb capacity furnace the stirrer weighs 13,000 lb. Furnaces' coils are protected from possible adverse effects of overheating by a warning system which is temperature actuated. The system includes temperature measuring devices consisting of thermistors installed at various positions on the furnace bottom. Its function is to indicate water temperature in the coil cooling system and of the furnace bottom.

Alarm System Used

These temperature measuring devices are set to trip an alarm system if a predetermined maximum safe temperature is exceeded. When the alarm system for the furnace bottom is tripped, a horn sounds. The stirrer then automatically stops. If the coil or its coolant have become overheated, a bell sounds and the stirrer also stops. Signal lights indicate the nature of the trouble and the exact hot spot





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This you can be sure of . . . when Levinson takes your fabricating order your job will be delivered as specified and on time. This reputation for being on schedule plus top quality design, fabrication and erection is another reason why we say: "Leave it to Levinson." Warehousers, fabricators, designers of steel for over half a century.

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consider the profit angle



. . . in salvaging and marketing your sheet metal scrap!

If your metal stamping or metal forming operations are generating sheet metal scrap in substantial volume — you have a disposal problem to solve.

In many plants the baling of sheet metal scrap has proved a highly profitable operation in the disposal process — resulting in such benefits as lower scrap handling costs, better use of floor space, increased production, higher average scrap prices.

Galland-Henning Hydraulic Baling Presses have been serving industry for many years in the low-cost salvaging of sheet metal scrap. If you are planning a new plant, the modernization or expansion of present facilities — the orderly baling of your sheet metal scrap is worth considering from the overall profit angle. Galland-Henning offers you competent counsel on this subject, without cost or obligation.

GALLAND-HENNING MFG. CO.
2725 S. 31st St., Milwaukee 46, Wisconsin

GALLAND-HENNING
SCRAP METAL BALING PRESSES

is found by manipulation of indicating temperature dials on the panel board.

Current is supplied to the stirrers on both furnaces by a special single-phase 1.4 cycle commutator type generator rated at 250 kva at 0.2 pf, driven by a 280 hp, 60 cycle, 440 v, 1770-rpm three-phase slip-ring, induction motor. Excitation is to be provided by a specially built Schrage phase and frequency converter with a rotating primary and regulation windings and stationary secondary winding.

The moving magnetic field generated by the current flowing in the stirrer coils may be caused to move in either of two opposite directions so that the metal flow in the furnaces may be directed up at the spout for pouring, or up at the slag door for slag-off operations.

Methods:

Unit provides faster die preparation

Die holding, fitting and separating during critical die finishing operations are being handled via a new technique by a major toy manufacturer. Both time savings and increased efficiency have been reported.

Prior to installation of a special die part machine at the New Haven plant of the A. C. Gilbert Co., they used a hydraulic press to "pull a pattern" from which to check the fit of the punch and die. This is a well known method used by many companies doing similar work. However, it is a time-consuming job which includes positioning of the punch and die in the press, careful stamping of the pattern, removal of the punch and die, and painstaking separation with pry bars.

The punch was then carried to a work bench, filed as required and returned to the hydraulic press for anothern pattern, to be followed by another, and yet another, until the punch and die set passed its final critical inspection. During much of the work, two men

were required and the hydraulic press was "down" for production work.

Replacing the older method is the die part elevator developed by the Hamilton Tool Co., Hamilton, Ohio. It is of standard construction except for the top plate. This is designed especially for the work and features an integral tilting mechanism.

Following the new technique at A. C. Gilbert, the die is bolted to the unit's middle plate and the punch is positioned on the shank. The punch is then clamped to the top plate and with hand crank pressure, a pattern is taken. The punch and die are then separated by means of the same crank mechanism.



Operator files punch on new die handling setup.

Next, transferring the hand crank to the upper position, the special top plate is rotated to a convenient work position. The necessary filing is then done. Subsequent patterns are made without any repositioning of the die and punch.

In this way Gilbert has reduced a difficult two-man job to a convenient one-man job, has freed a hydraulic press for production work, has saved time and increased efficiency in die making. Further, the unit can be wheeled to any place in the shop that offers the best light and facilities for a particular job.

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Continental's new technique for producing #3 finish flat and special shaped wire offers you a range of standard and special wire shapes with a satin smooth finish for electroplating purposes. Previously, only flat wire with a surface suitable for high polish electroplating was obtainable...but now from Continental you can specify #3 finish in flat, square, rectangular, oval, and other shapes on inquiry, in practically any size, temper, and analysis in low carbon and medium low carbon steels. (Note—some sizes of above shapes require special tooling before they can be produced.) Here is extra "eye-appeal" for moldings, product trim, or wherever a formed plated wire component is required. Send us a blueprint of your part, or mail the coupon today.

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NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies... for more data use the free postcard on page 117 or 118.



Five complex milling operations done, tool changes low

Five complex milling operations are carried-out with a new milling machine that holds down tool changes and parts handling to a minimum. The machine is a typical example of operation simplification and floor space savings that can be achieved by incorporating suitable controls and drives in a special machine for low production requirements. Basically it consists of a welded steel T-shaped base on which are mounted a 40-in. diam rotary table and a horizontal slide unit carrying a vertical spindle. Table speed, vertical cutter travel and horizontal slide travel are controlled by stops mounted on the table periphery. Thus it is possible to provide a variety of cutter locations, interrupt cuts and change table speeds by suitable stop locations. Cutter speeds are adjusted by a variable speed drive. *Snyder Tool & Engineering Co.*

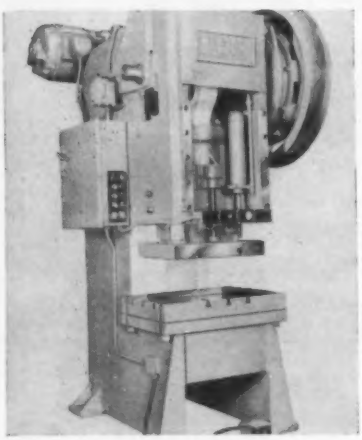
For more data circle No. 28 on postcard, p. 117



Cylindrical grinder works large, light pieces

Precision grinding of large, relatively lightweight workpieces is performed on a cylindrical grinding machine. This 30-in. semi-automatic grinder is available in work lengths of 48, 72 and 96 in. It will handle work to 30-in. diameter. Wide cables and ways are built into the unit to provide rugged support to the work. Wheel spindles run in long, full bearings, pressure lubricated. Automatic or manual feed settings are speeded by means of "click-count" wheel feed index with which feed increments as fine as 0.0001-in. in work diameter reduction are set without visual attention. Wheel feed is accomplished by means of a rotating screw type automatic wheel feed mechanism for repetitive accuracy. The automatic cycle is actuated with a single lever, located at the operator's position, and terminates either manually or by electrically timed control, according to the manufacturer. *Norton Co.*

For more data circle No. 29 on postcard, p. 117



Fixed base press operates on flywheel or gears

Fabricated steel frame 75-ton fixed base presses are available in either flywheel or geared types. They come in single speed or variable speed drive for either. The presses have long flanged slides with barrel type adjustment and box-type cast construction. This eliminates way deflection and increases guiding to attain slide to bed parallelism, so important to die life and product accuracy. They are available with standard manual slide adjustment or with air power adjustment as an extra. Two pneumatic counterbalances on slide are standard. Lubrication is by a press driven cyclic automatic oil system. However, recirculating oil lubrication systems are also available. Either flywheel or geared presses are equipped with a combination air friction clutch and brake unit mounted on the crankshaft within the flywheel or main drive gear. On geared presses, gears are totally enclosed, running in oil. Standard stroke of slide is 4-in. with a 8-in. stroke available. *Minster Machine Co.*

For more data circle No. 30 on postcard, p. 117

ONE OF A SERIES . . .

What makes a cylindrical roller bearing good?

The RIGHT ROLLER DESIGN and QUALITY CONTROL

The design and quality of the *rollers* play a large part in the performance of a cylindrical roller bearing. At right are some of the vital factors which must be considered.

All these factors are scrupulously controlled by the most modern precision equipment to insure maximum performance and life for every HYATT Roller Bearing. You'll find more details in HYATT General Catalog No. 150, or your nearby HYATT Sales Engineer will gladly help you choose the type best suited to your requirements. Remember, HYATT is America's *first* and *foremost* maker of cylindrical roller bearings. Hyatt Bearings Division of General Motors, Harrison, New Jersey.

GM GENERAL MOTORS
HYATT
ROLLER BEARINGS

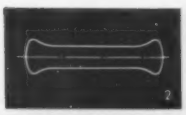
1. DISTRIBUTION OF LOAD WITHIN THE BEARING

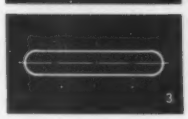
Rollers are subjected to load only while in the "load zone," with maximum load while on the line of action of the bearing load, as shown in diagram 1. The theoretically perfect "load zone" extends from −90° to +90° from the line of action, but this is neither practical nor necessarily desirable. Under normal loadings, the actual "load zone" may range from 90° to 120°, depending on load and mounted internal clearance. This distributes the load so the load on the heaviest-loaded roller is approximately 5/N times the bearing load, where N is number of rollers.



2. DISTRIBUTION OF LOAD WITHIN ROLLER'S AREA OF CONTACT

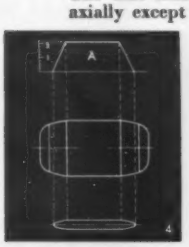
A cylinder deflects locally in the region of engagement when loaded between flat plates. The plate also deflects, so the original line of engagement is broadened into a "dog-boned" area under load, as shown in diagram 2. Moreover, deflected cylinders must gather in metal at their ends in *two planes, and this end-loading effect can seriously reduce the life of a cylindrical roller bearing.* All HYATT rollers have generous corner radii or blended chamfers to reduce end effect; and all HYATT Hy-Load rollers also have crowning to allow the contact area to "fade out" evenly (diagram 3).





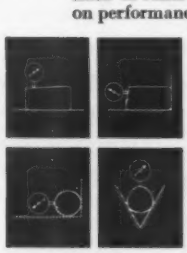
3. DISTRIBUTION OF LOAD ACROSS ROLLER

The unit load on any roller is uniformly distributed axially except at the crowned ends where it drops off to zero as shown in diagram 4. The summation of unit loads represented by area A is the total roller load. This same load under misalignment results in an area equal to area A; but maximum unit load is considerably greater and the bearing will have a shorter life than a properly aligned one. When the same total load is applied to an *uncrowned* roller, an even higher unit load results. This demonstrates the value of crowning when misalignment occurs.



4. EFFECT OF ROLLER QUALITY ON BEARING PERFORMANCE

Lack of roller quality control has a very adverse effect on performance: 1. A roller with excessive *taper* tends to uneven load distribution and abnormal temperature rise. 2. A roller with excessive *end square* tends to noisy bearing performance. 3. A roller with excessive *two-point out-of-round* tends to poor segregation and poor bearing life. 4. A roller with excessive *three-point out-of-round* tends to noisy bearing operation. 5. A roller with *poor finish* tends to wear on all operating surfaces and noisy operation. 6. A bearing with excessive *roller-to-roller diameter variation* tends to poor bearing life. 7. A bearing with excessive *roller-to-roller length variation* tends to poor thrust capacity, abnormal temperature rise.

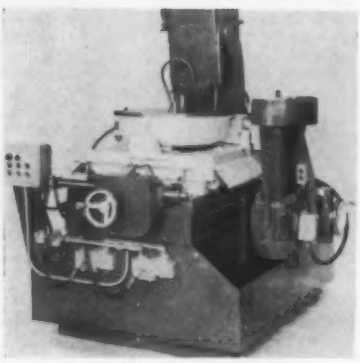




Inspection unit tests nonmagnetic material

Nondestructive testing of nonmagnetic rod, wire, tube and bars is automatically carried out with this inspection unit. The instrument automatically detects such problems as seams, overlapping, diameter changes, inclusions, voids, concentrated porosity, metallurgical variation and splits. It is recommended for high speed plant operation. The unit is the first of a new line of instruments designed to cover the whole range of nonmagnetic materials from aluminum, brass and copper to tungsten, austinitic stainless and titanium in a range of diameters from 1/64 to 3-in. They are designed for either completely automatic, high speed operation on production lines or hand operation in laboratories. Unit can be operated at production speeds in excess of 150 to 300 fpm. It can be equipped with automatic signaling and recording devices, according to the manufacturer. *Magnaflux Corp.*

For more data circle No. 31 on postcard, p. 117



Rotary abrasive belt grinder operates at high speed

Operating at high speed, a new automatic rotary abrasive grinder grinds and finishes many materials' outside diameters. The wet-or-dry unit grinds ferrous or nonferrous metals, plastics, ceramics, glass, etc. It handles circular parts from 26 to 40-in. in diam, and can be modified to meet other diameter ranges. A self-contained motor-driven work table rotates at standard speeds of either ¾ or 3 rpm, with optional change gears for other rpm requirements. Infeed travel is adjustable with a minimum of 0.0016-in. per revolution. To insure even belt wear distribution, parts are moved back and forth across belt's face by an air-hydraulic reciprocating device. Grinder is 70-in. long, 70-in. wide and 76-in. high. It is powered by a 10-hp motor. *Engelberg Huller Co.*

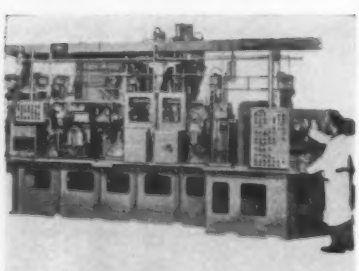
For more data circle No. 32 on postcard, p. 117



Dry system extinguishes fires automatically

A compact low-cost automatic dry chemical fire extinguishing system quells blazes caused by liquids, electrical and textile fire hazards. The 30-lb piped system can be operated either automatically or manually. It is intended primarily for protection of moderately-sized hazards, such as paint spray and dip operations, small transformer vaults, heat-treating and oil quench operations, ovens, overhead cranes, stationary engines and textile lint hazards. The extinguisher consists of a 30-lb capacity dry chemical unit installed near the hazard. It serves as a storage tank for the dry chemical. A special CO_2 gas pressure cartridge furnishes pressure to expel the dry chemical onto the fire through piping connecting the dry chemical unit with the hazard area. Depending on requirements, the system can provide total flooding or local application. Special nozzles are provided to give the most efficient discharge of dry chemical for each type of application. Automatic operation occurs when heat causes a fusible metal link to part. *Ansul Chemical Co.*

For more data circle No. 33 on postcard, p. 117



Automated piston machine combines two units into one

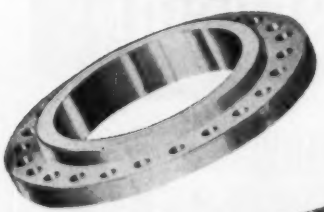
Combining a "dial type" and an "in-line type" machine, this automated piston machine offers advantages of both in a single setup. It has 14 stations, five in the dial type section, and nine in the in-line portion. The machine produces 400 pistons an hour. Any one of three different pistons are processed merely by changing the position of a selector switch and fixture locators. It's built to J. I. C. hydraulic and electrical standards. Lubrication is automatic throughout. A chip conveyor is provided in the base of the automatic piston machine. *LaSalle Tool, Inc.*

For more data circle No. 34 on postcard, p. 117

ALCO FLANGES . . .









Craftsmanship in steelmaking, forging and machining assures quality in the ALCO flange.

The ALCO flange is produced of high-quality carbon or alloy steel, made in ALCO's own furnaces. Steel production by the flange manufacturer lowers your welding, preheat and postheat costs because exact metallurgy is assured.

Forging and rolling techniques, drawn from ALCO's extensive experience, increase the quality of the ALCO flange. Metallurgical laboratories check metal characteristics through every step of flange production.

Finish and tolerances on the ALCO flange are provided by skilled machinists. You get flanges that fit right, work right in the job you assign to them.

The ALCO flange is available in a wide range of metallurgies to almost any specification. Fast delivery and prompt service on standard flanges are available from two locations, Beaumont, Texas and Latrobe, Pa. Sizes range from 18 in. up.

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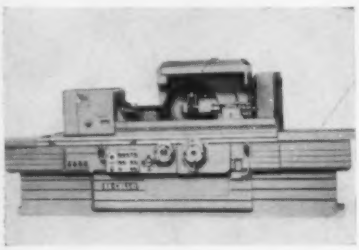
Company .....

Address .....

City ..... Zone ..... State .....

Thread grinder holds pitch diameters to ±0.0002-in.

This thread grinder is built to hold pitch diameter to ±0.0002 in. Lead tolerance of ±0.0002 in any one inch, or ±0.0005 in. in any 12-in., can be held when grinding any standard thread form. Seven styles of thread grinders of external and internal and universal types are presently available in the line. Use of ground threads, say the makers, is increasing. Among reasons for this are: (1) extreme accuracy required of threads in many applications, and (2) hardness of the metals from which components are being made. *Ex-Cell-O Corp.*



For more data circle No. 35 on postcard, p. 117

Swager takes 16-in. taper in a single pass

A new long-die swaging machine is capable of taking a 16 in. long taper in a single pass. It can produce finished, modern tapered furniture legs at the rate of three per minute from a variety of tubular materials including stainless steel and aluminum. Special long dies, the heart of the swager, measure 2¼ x 1-19/32 in. x 15 in. They are made to high precision standards under strict quality control supervision during every step of manufacture. All dies are made by master toolmakers working closely with the designers and builders of the swaging machines. Die tolerances are such that die halves may be interchanged and still produce a quality product, according to the manufacturer. *Fenn Mfg. Co.*

For more data circle No. 36 on postcard, p. 117

How to draw a BLANK and make a winning hand!



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Cleveland Pressed Products Corporation

Here's a source for steel plate blanks the way you want them — uniform, accurate to dimensions, concentric (where it applies) and FLAT — ready to use or to finish for your special needs.

From our more than 3500 tons of plate, mild or high carbon — thicknesses through 1½" — we can stamp heavy duty discs, washers or rings almost any diameter up to 26½" from our standard dies. Or tool up to make special flat shapes to your design and specifications. Presses ranging to 1400 ton capacity assure you clean-cut blanks that beat results from any other method. Also complete flame-cutting facilities.

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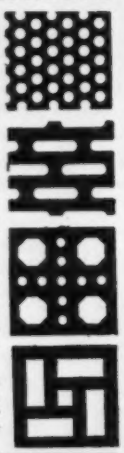
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290 Riverside Ave.,
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New 6000 lb truck features low silhouette for safety



Operator safety is stressed in a new low-silhouette 6000 lb electric fork truck design. The truck, recommended for loading closed highway trucks and trailers, needs only six feet of clearance. However, the operator's seat is just 38-in. below the top of the mast. Thus the operator's head is below the mast's top. This, of course, eliminates the danger of his striking any low overhead. Features of the fork truck include: high stability, easy maintenance and operator comfort and convenience considerations. There is no cowl, so the operator has a good view of the load and the floor immediately ahead of the truck. Absence of the cowl makes it easier to mount and dismount. The floor plate is clear of obstructions for the same purpose. Controls, including those for auxiliaries, are conveniently located and easy to actuate. Steering and controls are automotive-like. *Baker-Raulang Co.*

For more data circle No. 37 on postcard, p. 117

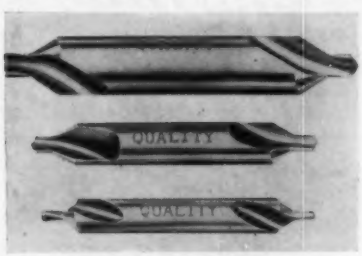
Vacuum furnace

A new standard 12-lb vacuum induction furnace model is a completely integrated furnace including a high vacuum pumping system, power supply, and instrumentation. It can be used for vacuum melting, alloying, casting, hardening, annealing, sintering and degassing. It includes provisions for conducting all operations possible in larger, more expensive vacuum furnaces. *NRC Equipment Corp.*

For more data circle No. 38 on postcard, p. 117

Drill, countersink

High-speed combined drills and countersinks feature a spiral flute design which gives smooth cutting action and reduces breakage. They



are available in either bell-style or plain style. *Quality Tool Wks.*

For more data circle No. 39 on postcard, p. 117

Grinding wheels

Air-conditioned grinding wheels for cooler cutting introduce a new concept of grinding wheel structure. Due to grit spacing for improved chip clearance, wheels are fast and cool cutting. *Electro Refractories & Abrasive Corp.*

For more data circle No. 40 on postcard, p. 117



ERIE **Bolts • Studs • Cap Screws • Nuts**
In Alloys • Stainless • Carbon • Bronze

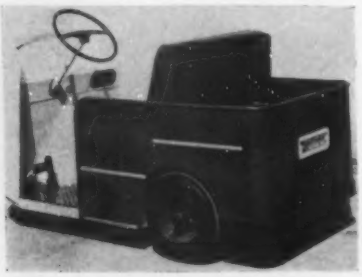
Only the hands of the specialist can produce fasteners which will meet your design and engineering specifications with precise accuracy. Erie has been doing just that for more than 40 years . . . producing to customer specifications bolts, studs, cap screws and nuts for use in extreme temperature, corrosion and tensile applications for a wide diversity of industries. Submit your specifications to us with confidence.

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Operating at a fraction of a cent per mile, a new electric car is recommended for interplant service. It is 30 in. wide and 74 in. long, and has a ¼-ton cargo capacity. Automotive type steering wheel insures a sharp turning radius, coupled with maneuverability. Powered by four heavy-duty automotive batteries which allow continuous use, the unit is able to go three speeds forward and three reverse. Elliptical spring suspension provides a smooth ride, and special wide tread tires take most terrain with ease. It is equipped with two-wheel brakes. *West Coast Machinery, Inc.*



For more data circle No. 41 on postcard, p. 117

Lift truck features easy operation

Heavy loads on skids are moved with a new 1500-lb capacity lift truck. Its framework is made of 3-in. structural steel channel. This gives it strength and rigidity. Ease of operation is assured by use of large diameter roller bearing steel wheels which roll easier on hard surfaced floors. Front wheels swivel easily on ball bearings. The complete turning radius is only 49½-in. It is compact with an overall width of only 25-in. and an overall length of just 43 in. *Thern Machine Co.*

For more data circle No. 42 on postcard, p. 117

QUANTITY PRODUCTION OF GREY IRON CASTINGS

ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
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SILENT HOIST
KRANE KAR

"HAS GIVEN US EXCELLENT SERVICE AT LOW MAINTENANCE COST," says
ATLAS FORGINGS COMPANY
CICERO, ILL.

"KRANE KAR Unloads freight cars of billets weighing up to 6000 lbs.... Stacks them in yard... Transports billets to saw shop... Loads forgings on trucks for shipment. KRANE KAR is easier to use than our old stationary crane, and saves us time. Now we can make full use of our yard for billet inventory." Ask for Bulletin #79.

Ask about our Lease-a-KRANE KAR-Plan ... 1 to 3 Year Lease with Option to Purchase.

Another SILENT HOIST "First" —FLUID DRIVE!

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Metal Stamping Facilities by Lansing

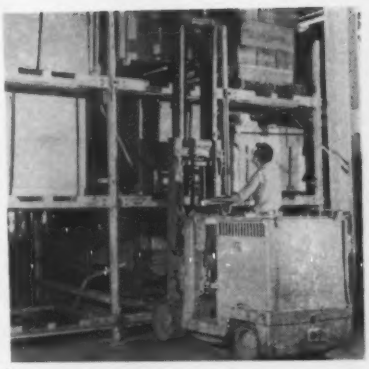
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Lansing Stamping Co.
ESTABLISHED 1914
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Live storage racks accommodate heavy loads

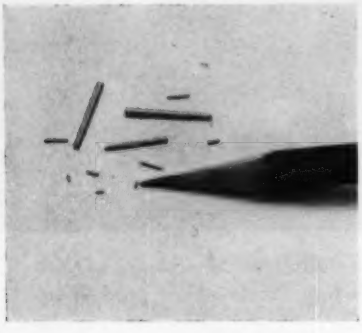
Made of heavy conveyor rollers, these heavy duty racks give quick reference organization, efficient short-term storage for extra large or heavy loads. They will accommodate palletized loads, large packages, metal parts, and other loads weighing tons. Heavy loads move through rack lanes by gravity, are retarded by automatic brakes and hand operated stops. A complete line of light and heavy duty rollers are available from 30 to 8000 lb capacity per roller. In addition, the manufacturer can supply custom and pre-engineered "live storage" racks made of the company's live rails. These can be utilized for storing a variety of lighter weight items such as short-lived inventory, parts in process, palletized loads, etc., according to the manufacturer. *Alvey-Ferguson Co.*

For more data circle No. 43 on postcard, p. 117



Miniature pins

Miniature precision pins are now being made as small as 0.020 in. diam by 1/16 in. long and are held to a 0.0002 in. limit on their diameter. Taper pins are made in the complete range down to 9/0.



Stainless steel pins are used on ordnance fire control equipment, electronic computers, guided missile controls, gyroscopes and office equipment. Larger pins are produced by the millions each year in the company's up-to-date plant. *Peaslee Metal Products Co.*

For more data circle No. 44 on postcard, p. 117

Punch shaper

High precision, close tolerance punches with curved necks are produced on a new form and punch shaper. Punches need no further machining operations when completed on the shaper. All workpieces are clamped directly in a collet holder, between centers or to the coordinate chuck. Coordinate chuck and indexing attachment guides the work piece along the contour with one chucking. *Jersey Mfg. Co.*

For more data circle No. 45 on postcard, p. 117

NOTICE
to users of spindles* that need repair or rebuilding

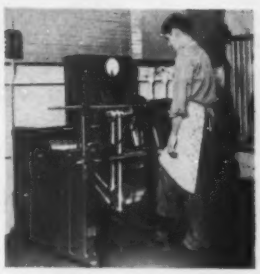
POPE — the leading builder of precision spindles IS THE BEST PLACE TO HAVE YOUR SPINDLES MADE GOOD AS NEW.

Today's grinding, milling and boring tolerances demand precision spindle performance.

Pope puts your spindles in shape *quickly*, at lowest cost. (Cost figures are promptly submitted for your approval before the work is done.)

The same expert craftsmen that build Pope Precision Spindles will assemble, preload and lubricate the proper bearings and dynamically balance. The job will be done *right* the first time.

Send Your Spindles for Repair to POPE



Spindles repaired and rebuilt by POPE are assembled in an electrically air cleaned, air conditioned room. They are dynamically balanced, as pictured, to the same tolerances as new spindles. This assures better surface finishes and smoother running spindles.

* POPE Repair and Rebuilding Service applies to ANY SIZE, ANY MAKE of Anti-Friction Bearing SPINDLES.

Belt Driven
Motorized
High Cycle



POPE MACHINERY CORPORATION
261 River St., Haverhill, Massachusetts

Mail me a copy of Bulletin R-1 describing in detail Pope Precision Spindle repair and rebuilding service:

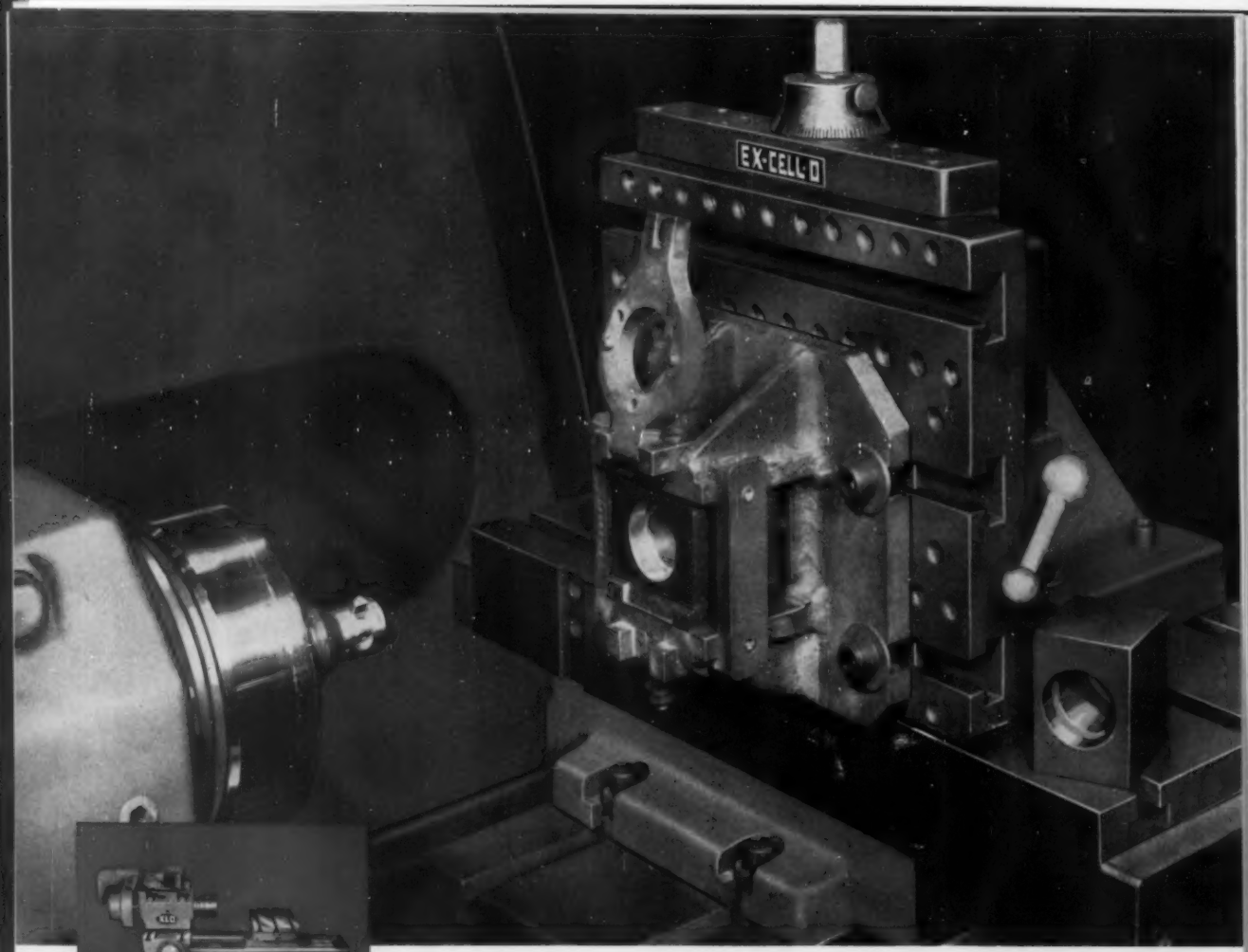
Name.....

Company.....

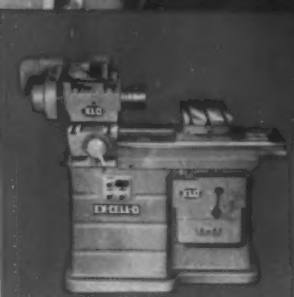
Address.....

City.....Zone....State.....

No. 114



Close-up view of Ex-Cell-O Precision Boring Machine equipped with a single spindle and a universal fixture for small lot production.



2112-B single-end Ex-Cell-O Precision Boring Machine with horizontal cross slide fixture.



1212-B double-end Ex-Cell-O Precision Boring Machine with universal fixture having cross and vertical slides.

These versatile machines keep busy

Ideal machines for toolroom work and short production runs

These Ex-Cell-O Precision Boring Machines equipped for general-purpose work perform precision boring, turning, facing and chamfering operations quickly and economically.

They can be operated automatically or manually. Spindle speeds are easily changed to suit the operation. Universal fixture rigidly holds tools and work pieces of many sizes and shapes. Horizontal and vertical slides of the fixture permit precision positioning of either tools or work.

A complete line of precision boring machines is available. For information just call your Ex-Cell-O representative or write Ex-Cell-O in Detroit.

EX-CELL-O CORPORATION

EX-CELL-O FOR PRECISION

XLO

DETROIT 32, MICHIGAN MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

56-51

The Iron Age SUMMARY . . .

Problems are piling up on steel producers . . . Scarcity of shipping space, uncertainty of automotive market and rising production costs . . . Market tightening generally.

Mill Worries . . . Problems are mounting for steel producers. They include: (1) A growing shortage of shipping space, (2) uncertainty about the volume of automotive demand, and (3) rising production costs.

Lack of freight cars is forcing some mills to reshuffle their shipping schedules to get steel to hardship cases. They're also turning more to trucks and barges, increasing the burden on these facilities. Indirectly, the freight car shortage builds up greater pressure for increasing plate and structural deliveries to the car builders.

The auto producers apparently are biding their time on commitments for December steel deliveries. The mills are trying to keep space open for the autobuilders and hope that the expected volume of orders comes through. Public reaction to new models will make the difference. If 1957 cars go over big, Detroit consumers will be pitching for heavier tonnages.

Costs Up . . . Rising production costs are a real problem for the steel companies. The recent coal contract, boosting miners' wages $1.20 per day immediately and 80¢ next April, is one of the latest. Other costs also have risen since last August's steel price rise, putting a squeeze on earnings.

This means that some time next year—if not before July 1, then on that date—steel prices will be boosted. It could be $6 to $7 a ton.

The market is tightening up all along the line. Cold-rolled sheet demand is coming back; hot-rolled sheet is becoming a shortage item. Plate and structural demand is astronomical.

Meanwhile, the mills are operating at breakneck speed in an effort to ease the pressure. Steel production this month may set an all-time monthly record. November and December also will be big production months. Current monthly record of 10.9 million tons was set last March.

Buyer Switch . . . An added feature in the tightening market is the switch by steel purchasing agents from a position of living off inventories to one of active buying. They've decided that under the circumstances, it's too risky to lean further on inventories. They are placing orders on the basis of present need. And this need appears to be increasing, as orders for plant and equipment goods rise.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,511	2,511	2,462	2,238
Ingot Index				
(1947-1949=100)	156.3	156.3	153.3	145.0
Operating Rates				
Chicago	102.0	111.0*	103.0	96.5
Pittsburgh	103.0	102.0	98.0	101.0
Philadelphia	105.0	104.0	102.0	98.0
Valley	97.0	99.0*	99.0	97.0
West	106.0	105.0*	102.5	75.0
Detroit	106.0	102.0	104.0	98.0
Buffalo	105.0	105.0	108.0	105.0
Cleveland	104.0	107.0*	109.5	105.0
Birmingham	96.0	96.0	96.0	97.5
S. Ohio River	95.0	91.0*	90.0	89.0
Upper Ohio R.	106.0	107.0	101.0	103.0
St. Louis	106.0	100.0	96.0	106.0
Northeast	100.0	100.0	100.0	83.0
Aggregate	102.0	102.0	100.0	96.5

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.622	5.622	5.622	5.174
Pig Iron (Gross Ton)	$63.04	$63.04	$63.04	$59.09
Scrap, No. 1 hvy (gross ton)	$56.17	$57.33	$58.83	$44.83
Nonferrous				
Aluminum ingot	27.10	27.10	27.10	24.40
Copper, electrolytic	40.00	40.00	40.00	43.00
Lead, St. Louis	15.80	15.80	15.80	15.30
Magnesium ingot	36.00	36.00	36.00	33.25
Nickel, electrolytic	64.50	64.50	64.50	64.50
Tin, Straits, N. Y.	104.00	103.00	101.25	96.125
Zinc, E. St. Louis	13.50	13.50	13.50	13.00

*Revised

Slow Ordering By Carmakers

Mills are puzzled by industry's hesitancy to get more into market . . . U. S. Steel, Republic revise merchant wire bases . . . Major producers advance ferromanganese.

◆ RELUCTANT automotive buyers are still obscuring, to an extent, the true status of the product supply situation for this quarter.

While automotive tonnages are growing—October orders for flat rolled were above September's—and November orders are running above this month's—there is still some hanging back.

Yet what the automakers don't want or haven't spoken for is welcomed by appliance makers and other users. Even warehouses which are expressing concern over slackness in auto industry business report sheet, plate, bar, and structural stocks are mighty low at this point.

American Steel and Wire, Columbia-Geneva Steel and Tennessee Coal and Iron Divisions of U. S. Steel Corp. have made revision in mill price bases for major merchant wire products effective Oct. 3 (Changes will be found on merchant wire products price table on p. 165).

U. S. Steel's mill price bases for the general trade, other than jobbers, were reduced from $3 to $5 per ton on such products as nails and staples, barbed wire, and fences. The Corporation withdrew mixed carload prices, and extras for quantities less than stated minimums were established for mill shipment of merchant wire products.

Republic Steel Co.'s Wire Division made a similar announcement.

The U. S. Steel move in effect established a quantity selling basis with no functional allowances. Dealers and distributors can buy 20,000 lb made up of increments of at least 1000 lb each of a product to get the same discount as a jobber. Previously a dealer could buy as much as a jobber but not get as high a discount. Net result of the move is a reduction in prices to dealers and the general trade.

Other News: Bethlehem and Republic have announced increases in electrolytic tinplate effective Nov. 1 of 10¢ per base box. U. S. Steel announced a similar increase earlier. U. S. Steel and Bethlehem have raised ferromanganese prices from 10¾ to 11¾ cents per lb. Other producers made a like adjustment previously.

BARS . . . Pressure for hot-rolled bar continues to grow at **Chicago**. Cold-finished bar deliveries there are running four to six weeks largely due to shortages of hot-rolled in cold-finisher inventories. Cold-finished demand is moving up strongly with finishers talking about a strong fourth quarter. Output should be limited only by the lack of hot-rolled.

Some rolling time is still open for December at **Cleveland** due principally to a temporary slowdown in forging plants supplying the auto industry from Northeastern Ohio area. Cold-finished bars continue in easy supply and demand.

At **Detroit** forging bars are rapidly becoming one of the tightest items. Nobody seems able to get them in the sizes and quantities wanted. Cold-drawn bars are also tightening but are nothing like the hot tops as far as supply is concerned.

Automotive industry demand for bars on the **West Coast** is picking up. There's some market tightening as a result of a shift of bar tonnage to plate and sheet mills.

SHEET AND STRIP . . . Hot-rolled sheet continues in short supply at **Detroit**. No real shortage of cold-rolled yet. Warehouses report a good supply. Also on the easy side are galvanized, zinc coated, silicone and enameling iron. Strip business continues to pick up and become stronger. Principal demand, according to a leading producer, is from vendors and appliance people.

Last minute deferments in the **Cleveland** market on the part of automakers are creating several large openings for cold-rolled sheet for November. Trend might continue into December.

Auto companies are holding off releases for December until last possible minute in mid-October, and there's likelihood some tonnage may be deferred until later. Mills operating at near capacity on sheet but order intake is from about 15 pct under to barely equal shipments. Hot-rolled sheets continue tight.

One **Pittsburgh** producer booked solidly through December on cold-rolled sheets and through January on hot-rolled. Only softness is cold-rolled strip, where automotive buyers are still holding back. However, with auto tonnages steadily growing, the whole flat rolled picture is tightening.

Sheet and strip at **Chicago** are all sold out for the remainder of the year. There will probably be carryover in sheet. No real automotive sheet pressure yet, just requests for increases in quotas, which they are not getting. Conversion of hot-rolled sheet is an important factor.

PIG IRON . . . Pick up in business at **Chicago** has been less than expected. Foundries, while still working a five day week, are stretching some of their work to avoid cutting down and are operating on a low pig inventory (about 15 days in some cases). However, there's been an increase in pig iron shipments locally in the latter half of September.

WIRE . . . There are solid bookings for fourth quarter at **Chicago** and outlook indicates more of the same for first quarter. Consumer inventories are low, both on merchant products and manufactured grades, so prospects indicate a real bind by end of present quarter.

Purchasing Agent's Checklist

SPECIAL REPORT: Fire! How safe is your plant? . . . . . p. 55

BUSINESS: Do company planes pay off? . . . . . p. 60

TRANSPORTATION: Freight cars are getting very tough to get . . . p. 62

MARKETING: Instrument industry set for expansion . . . . . p. 64

WASHINGTON: Will money squeeze get any tighter? . . . . . p. 77

Comparison of Prices

(Effective Oct. 9, 1956)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Oct. 9 1956	Oct. 2 1956	Sept. 11 1956	Oct. 11 1955
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.675¢	4.675¢	4.675¢	4.325¢
Cold-rolled sheets	5.75	5.75	5.75	5.325
Galvanized sheets (10 ga.)	6.30	6.30	6.30	5.85
Hot-rolled strip	4.675	4.675	4.675	4.325
Cold-rolled strip	6.870	6.870	6.870	6.29
Plate	4.87	4.87	4.87	4.52
Plates, wrought iron	10.40	10.40	10.40	9.30
Stainl's C-R strip (No. 302)	47.50	47.50	47.50	44.50
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.85	$9.85	$9.85	$9.05
Tinplates, electro (0.50 lb.)	8.55	8.55	8.55	7.75
Special coated mfg. ternes	9.10	9.10	9.10	7.85
Bars and Shapes: (per pound)				
Merchant bars	5.075¢	5.075¢	5.075¢	4.85¢
Cold finished bars	6.85	6.85	6.85	5.90
Alloy bars	6.125	6.125	6.125	5.65
Structural shapes	5.00	5.00	5.00	4.60
Stainless bars (No. 302)	40.75	40.75	40.75	38.25
Wrought iron bars	11.50	11.50	11.50	10.40
Wire: (per pound)				
Bright wire	7.20¢	7.20¢	7.20¢	6.25¢
Rails: (per 100 lb.)				
Heavy rails	$5.075	$5.075	$5.075	$4.725
Light rails	6.00	6.00	6.00	5.55
Semifinish Steel: (per net ton)				
Rerolling billets	$74.00	$74.00	$74.00	$68.50
Slabs, rerolling	74.00	74.00	74.00	68.50
Forging billets	91.50	91.50	91.50	84.50
Alloy blooms, billets, slabs	107.00	107.00	107.00	96.00
Wire Rod and Skelp: (per pound)				
Wire rods	5.80¢	5.80¢	5.80¢	5.025¢
Skelp	4.225	4.225	4.225	4.225
Finished Steel Composite: (per pound)				
Base price	5.622¢	5.622¢	5.622¢	5.174¢

	Oct. 9 1956	Oct. 2 1956	Sept. 11 1956	Oct. 11 1955
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$67.76	$67.76	$67.76	$63.69
Foundry, Valley	63.00	63.00	63.00	59.00
Foundry, Southern Cin'ti	67.17	67.17	67.17	62.93
Foundry, Birmingham	59.00	59.00	59.00	55.00
Foundry, Chicago	63.00	63.00	63.00	59.00
Basic del'd Philadelphia	66.84	66.84	66.84	62.77
Basic, Valley furnace	62.50	62.50	62.50	58.50
Malleable, Chicago	63.00	63.00	63.00	59.00
Malleable, Valley	63.00	63.00	63.00	59.00
Ferromanganese, cents per lb‡ 74 to 76 pct Mn base.	11.75¢	10¾-11¾¢	10.75¢	9.50¢
Pig Iron Composite: (per gross ton)				
Pig iron	$63.04	$63.04	$63.04	$59.09
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	*$55.50*	$57.50	$58.50	$44.50
No. 1 steel, Phila. area	*56.50*	57.00	58.50	46.50
No. 1 steel, Chicago	*56.50*	57.50	59.50	48.50
No. 1 bundles, Detroit	56.50	56.50	56.50	39.00
Low phos., Youngstown	*64.50*	65.50	66.50	49.00
No. 1 mach'y cast, Pittsburgh	*59.50*	60.50	60.50	48.50
No. 1 mach'y cast, Philadel'a	*57.50*	58.00	58.00	47.50
No. 1 mach'y cast, Chicago	*57.50*	58.50	59.50	53.50
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	*$56.17*	$57.33	$58.33	$44.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.50	$14.50	$14.50	$13.25
Foundry coke, prompt	$17-18	$17-18	$17-18	16.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	40.00	40.00	40.00	43.00
Copper, Lake, Conn.	40.00	40.00	40.00	43.00
Tin, Straits, New York	104.00†	103.00	101.25	96.125
Zinc, East St. Louis	13.50	13.50	13.50	13.00
Lead, St. Louis	15.80	15.80	15.80	15.30
Aluminum, virgin ingot	27.10	27.10	27.10	24.40
Nickel, electrolytic	64.50	64.50	64.50	64.50
Magnesium, ingot	36.00	36.00	36.00	33.25
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

† Tentative. ‡ Average. • Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on p. 164→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	64.50	65.00	65.50	66.00	.....
Birdsboro, Pa. *B6*	64.50	65.00	65.50	66.00	.....
Birmingham *R3*	58.50	59.00•	.....	.....	.....
Birmingham *W9*	58.50	59.00•	63.00	.....	.....
Birmingham *U4*	58.50	59.00•	63.00	.....	.....
Buffalo *R3*	62.50	63.00	63.50	64.00	.....
Buffalo *H1*	62.50	63.00	63.50	.....	.....
Buffalo *W6*	62.50	63.00	63.50	64.00	.....
Chester *P2*	64.50	65.00	65.50	.....	.....
Chicago *I4*	62.50	63.00	63.00	63.50	.....
Cleveland *A5*	62.50	63.00	63.00	63.50	67.50†
Cleveland *R3*	62.50	63.00	63.00	63.50	.....
Duluth *I4*	62.50	63.00	63.00	63.50	67.50†
Erie *I4*	62.50	63.00	63.00	63.50	67.50†
Everett *M6*	.....	63.75	64.25	.....	.....
Fontana *K1*	70.00	70.50	.....	.....	.....
Geneva, Utah *C7*	62.50	63.00	.....	.....	.....
Granite City *G2*	64.40	64.90	65.40	.....	.....
Hubbard *Y1*	.....	.....	63.00	.....	.....
Lone Star *L3*	58.50‡	59.00‡	.....	.....	.....
Midland *C11*	62.50	.....	.....	.....	.....
Minnequa *C6*	64.50	65.00	65.50	.....	.....
Monessen *P6*	62.50	.....	.....	.....	.....
Neville Is. *P4*	62.50	63.00	63.00	63.50	67.50†
N. Tonawanda *T1*	.....	63.00	63.50	64.00	.....
Pittsburgh *U1*	62.50	.....	63.00	63.50	.....
Sharpsville *S3*	62.50	63.00	63.00	63.50	.....
So. Chicago *R3*	62.50	63.00	63.00	.....	.....
Steelton *B3*	64.50	65.00	65.50	66.00	70.50
Swedeland *A2*	64.50	65.00	65.50	65.50	.....
Toledo *I4*	62.50	63.00	63.00	63.50	.....
Troy, N. Y. *R3*	64.50	65.00	65.50	66.00	.....
Youngstown *Y1*	.....	.....	63.00	63.50	.....

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. • Add $1.00 for 0.31-0.69 pct phos. † Intermediate low phos. ‡ Add $1.00 for 0.31 to 0.50 pct. phos.

Silvery Iron: Buffalo, *H1*, $72.50; Jackson, *J1*, *I4* (Globe Div.), $71.50; Niagara Falls (15.01-15.50), $99.50; Keokuk (14.01-14.50), $102.00; (15.51-16.00), $105.00. Add $1.25 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 14 pct. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon: $64.00.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill.

Product	291	292	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	19.75	21.00	20.50	22.00	—	23.25	35.25	28.25	32.75	—	16.00	27.75	16.25
Slabs, billets	24.50	27.25	25.25	28.00	28.50	29.25	44.50	35.75	42.00	—	20.75	—	21.00
Billets, forging	—	33.00	33.75	34.00	37.00	36.00	56.25	42.25	50.25	30.75	27.25	27.75	27.75
Bars, struct.	39.00	39.25	40.50	40.75	43.75	43.00	66.75	50.25	59.00	36.25	32.50	33.00	33.00
Plates	—	41.25	42.50	43.00	45.50	45.75	70.25	54.50	63.75	38.75	33.75	35.50	34.50
Sheets	45.00	45.25	47.25	47.50	55.75	50.25	74.75	60.00	73.00	46.50	38.75	46.50	39.25
Strip, hot-rolled	33.00	35.75	34.00	36.75	—	39.75	63.50	48.75	58.25	—	29.75	—	30.75
Strip, cold-rolled	41.50	45.25	43.75	47.50	52.00	50.25	74.75	60.00	73.00	46.50	38.75	46.50	39.25
Wire CF; Rod HR	—	37.25	38.50	38.75	41.75	41.00	63.75	48.00	58.25	34.50	31.00	31.50	31.50

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Ft. Wayne, *I4;* Philadelphia, *D5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville, Pa., *U2;* Detroit, *M2;* Canton-Massillon, O., *R5;* Harrison, N. J., *D3;* Youngstown, *C5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (.25 per lb higher); New Bedford, Mass., *R6;* Gary, *U1* (.25¢ per lb higher).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R3;* S. Chicago, *U1;* Syracuse, N. Y. *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5;* Ft. Wayne, *I4;* Philadelphia, *D5;* Detroit, *R5;* Gary, *U1.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Harrison, N. J., *D3;* Baltimore, *A7,* Dunkirk, *A3* (.25¢ per lb lower on Types 301, 303 and 316); Monessen, *P1;* Syracuse, *C11* (.25¢ per lb lower on Type 301, 304, and 304); Bridgeville, *U2.*

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Philadelphia, *D5;* Vandergrift, Pa., *U1;* Gary, *U1*

Forgings billets: Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1.*

Market Continues To Decline

Slight drops fail to panic market . . . High operating rate and continued strong export should prevent bottom dropping out of the market . . . Rails continue in short supply.

◆ THE SCRAP MARKET continued its decline, but there are few signs of nervousness in the trade despite the third consecutive week of sliding prices.

The reason: As long as the steel operating rate continues at its present rate of over 100 pct (this week setting a weekly tonnage record) the bottom is unlikely to drop out of the market.

Prices before the decline started were at an unrealistic high. Moderate declines have not injected any panic in the market and most of the trade predicts continued high prices, with perhaps some additional declines in specific areas to a more realistic level.

Another bolstering effect is continued high export on East and Gulf coasts which will prevent eastern markets from sagging to any great extent. On the West Coast, export is an even stronger factor, although there is some feeling that mills will be able to keep prices at close to their present level.

Midwest markets are also firm, but somewhat sharper declines were recorded in Chicago than in the East. Lack of export competition for the mills is partly responsible for the somewhat easier feeling there, although prices in Chicago were equal to Philadelphia and higher than Pittsburgh.

Some railroad grades declined, but only slightly. Rails are particularly tight in most markets.

Pittsburgh . . . Prices of openhearth scrap dropped $1 to $2 on the basis of purchase by a major mill. Low phos, cast, and some railroad grades are sharing the general market easing. An early railroad list showed No. 1 railroad heavy melting and specialties off $2. Cupola cast is down $2 on scattered foundry buying. The market is quiet as brokers are not pushing for delivery and the shortage of gondola cars is restricting the flow of scrap.

Chicago . . . The market continues its mild downward drift this week, with few mill orders in tonnage quantities as yet. Substantial amounts of scrap continue to move at previous higher prices. Turnings market was reinforced by a new purchase last week at existing price levels, but this grade is not expected to hold. Cast scrap seems to be the weakest of the grades and foundry buying shows only mild gains after the summer lull. Long term railroad orders are being written at slightly reduced prices, but this does not include rails, which continue in short supply.

Philadelphia . . . Steelmaking grades are down $1 on the high side. But this is more of a natural adjustment to the show of weakness which cropped up last week, rather than an indication of any additional soft spots. Generally speaking, the market seems to be holding firm, with unusual export activity plugging any gaps that might appear. Consumers report fairly good stocks on hand, will probably mean little domestic activity for next week or so.

New York . . . Steelmaking and cast grades are holding firm in this district with prices unchanged. Brokers and dealers expect little change as long as the current operating rate holds up. Some turnings grades are down $1, but this considered a minor fluctuation.

Detroit . . . Broker buying on No. 2 bundles dropped $2 this week. No. 2 heavy melting also declined on appraisal. There is no change in No. 1 grades, but consumers believe they will be able to buy at lower prices before the end of the month. General feeling is that the market has passed a crest and may decline gradually.

Cleveland . . . Market dropped $1 last week as a Valley consumer bought substantial tonnage of electric furnace steel at $65. Another mill purchased premium heavy low phos at $66. Secondary grades were also weaker in the Valley. Some Valley scrap is coming in from West Virginia due to a stronger market than Pittsburgh.

Birmingham . . . The market appears a little weaker in this district, although prices generally remained about unchanged. Some foundries reduced prices on specialties $2 per ton. Others, however, are maintaining previous prices to stimulate a good flow of scrap. Brokers are finding east scrap easier to buy, but because of high export no immediate reduction in prices is expected.

St. Louis . . . The market continues steady with only a few price changes. High prices have caused shipments to be satisfactory, and as long as operations continue at a high level consumers are inclined to let them stay generally as they are. A railroad list of 45 carloads of No. 1 railroad heavy melting brought prevailing prices. Some cast grades are down.

Cincinnati . . . An area mill purchased No. 1 heavy melting at $58 and $59, with brokers apparently having trouble covering at the lower figure. Primary grades are reported difficult to get from dealers without taking less desirable grades. Competition among re-rolling mills for random rails is pushing price to $80 or more when there is heavy percentage of rails over 5 ft.

Buffalo . . . No major sales have been made to affect prices, but the market appears to be somewhat weaker. Dealers expect the area's major consumer will come into the market in about 10 days, with prices close to the current level or perhaps a dollar or two lower.

Boston . . . The market is relatively quiet, with primary grades off $1 in general. Export is slow at the moment. One area consumer is active in the market, but another out.

West Coast . . . Prices may have reached a peak in this market. Scrap generation will automatically pick up as auto production and other seasonal factors enter the picture. On the other hand, exports continue at a terrific pace, which prevents the market from falling off.



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IMPORT & EXPORT – **LIVINGSTON & SOUTHARD, INC.,** 99 Park Ave., New York, N. Y. • *Cable Address:* **FORENTRACO**

Scrap Prices *(Effective Oct. 9, 1956)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$55.00 to $56.00
No. 2 hvy. melting	49.00 to 50.00
No. 1 bundles	55.00 to 56.00
No. 2 bundles	46.00 to 47.00
Machine shop turn.	38.00 to 39.00
Mixed bor. and ms. turn.	38.00 to 39.00
Shoveling turnings	42.00 to 43.00
Cast iron borings	42.00 to 43.00
Low phos. punch'gs plate	66.00 to 67.00
Heavy turnings	52.00 to 53.00
No. 1 RR. hvy. melting	65.00 to 66.00
Scrap rails, random lgth.	77.00 to 78.00
Rails 2 ft and under	81.00 to 82.00
RR. steel wheels	73.00 to 74.00
RR. spring steel	73.00 to 74.00
RR. couplers and knuckles	73.00 to 74.00
No. 1 machinery cast.	59.00 to 60.00
Cupola cast.	51.00 to 52.00
Heavy breakable cast.	49.00 to 50.00

Chicago

No. 1 hvy. melting	$56.00 to $57.00
No. 2 hvy. melting	46.00 to 47.00
No. 1 factory bundles	62.00 to 64.00
No. 1 dealers' bundles	56.00 to 57.00
No. 2 dealers' bundles	42.00 to 43.00
Machine shop turn.	35.00 to 36.00
Mixed bor. and turn.	37.00 to 38.00
Shoveling turnings	37.00 to 38.00
Cast iron borings	37.00 to 38.00
Low phos. forge crops	70.00 to 71.00
Low phos. punch'gs plate	67.00 to 68.00
Low phos. 3 ft and under	65.00 to 66.00
No. 1 RR. hvy. melting	63.00 to 65.00
Scrap rails, random lgth.	73.00 to 74.00
Rerolling rails	85.00 to 86.00
Rails 2 ft and under	83.00 to 84.00
Locomotive tires, cut	68.00 to 69.00
Cut bolsters & side frames	68.00 to 69.00
Angles and splice bars	73.00 to 74.00
RR. steel car axles	87.00 to 88.00
RR. couplers and knuckles	67.00 to 68.00
No. 1 machine cast.	57.00 to 58.00
Cupola cast.	52.00 to 53.00
Heavy breakable cast.	46.00 to 47.00
Cast iron brake shoe	47.00 to 48.00
Cast iron wheel	57.00 to 58.00
Malleable	69.00 to 70.00
Stove plate	48.00 to 49.00
Steel car wheels	68.00 to 69.00

Philadelphia Area

No. 1 hvy. melting	$56.00 to $57.00
No. 2 hvy. melting	47.00 to 48.00
No. 1 bundles	56.00 to 57.00
No. 2 bundles	45.00 to 46.00
Machine shop turn.	40.00 to 41.00
Mixed bor. short turn.	40.00 to 41.00
Cast iron borings	40.00 to 41.00
Shoveling turnings	44.00 to 45.00
Clean cast chem. borings	46.00 to 47.00
Low phos. 5 ft and under	61.00 to 62.00
Low phos. 2 ft and under	62.00 to 63.00
Low phos. punch'gs	62.00 to 63.00
Elec. furnace bundles	60.00 to 61.00
Heavy turnings	52.00 to 53.00
RR. steel wheels	69.00 to 70.00
RR. spring steel	69.00 to 70.00
Rails 18 in. and under	76.00 to 77.00
Cupola cast.	52.00 to 54.00
Heavy breakable cast	55.00 to 57.00
Cast iron car wheels	64.00 to 65.00
Malleable	68.00 to 69.00
Unstripped motor blocks	44.00 to 45.00
No. 1 machinery cast.	57.00 to 58.00

Cleveland

No. 1 hvy. melting	$61.00 to $62.00
No. 2 hvy. melting	46.00 to 47.00
No. 1 bundles	61.00 to 62.00
No. 2 bundles	39.00 to 40.00
No. 1 busheling	61.00 to 62.00
Machine shop turn.	33.00 to 34.00
Mixed bor. and turn.	38.50 to 39.50
Shoveling turnings	38.50 to 39.50
Cast iron borings	38.50 to 39.50
Cut struct'r'l & plates, 2 ft & under	66.00 to 67.00
Drop forge flashings	62.50 to 63.50
Low phos. punch'gs, plate	62.00 to 63.00
Foundry steel, 2 ft & under	57.00 to 58.00
No. 1 RR. heavy melting	65.00 to 66.00
Rails 2 ft and under	82.00 to 83.00
Rails 18 in. and under	83.00 to 84.00
Railroad grate bars	47.00 to 48.00
Steel axle turnings	43.00 to 44.00
Railroad cast.	60.00 to 61.00
No. 1 machinery cast.	57.00 to 58.00
Stove plate	54.00 to 55.00
Malleable	70.00 to 71.00

Youngstown

No. 1 hvy. melting	$63.00 to $64.00
No. 2 hvy. melting	48.00 to 49.00
No. 1 bundles	63.00 to 64.00
No. 2 bundles	45.00 to 46.00
Machine shop turn.	34.00 to 35.00
Shoveling turnings	40.00 to 41.00
Cast iron borings	40.00 to 41.00
Low phos. plate	64.00 to 65.00

Buffalo

No. 1 hvy melting	$54.00 to $55.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 busheling	54.00 to 55.00
No. 1 bundles	54.00 to 55.00
No. 2 bundles	42.00 to 43.00
Machine shop turn.	30.00 to 31.00
Mixed bor. and turn.	32.00 to 33.00
Shoveling turnings	34.00 to 35.00
Cast iron borings	32.00 to 33.00
Low phos. plate	59.00 to 60.00
Scrap rails, random lgth.	57.00 to 58.00
Rails 2 ft and under	77.00 to 78.00
RR. steel wheels	60.00 to 61.00
RR. spring steel	60.00 to 61.00
RR. couplers and knuckles	70.00 to 71.00
No. 1 machinery cast.	52.00 to 53.00
No. 1 cupola cast.	48.00 to 49.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$55.00 to $56.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 bundles, openhearth	56.00 to 57.00
No. 2 bundles	35.00 to 36.00
New busheling	55.00 to 56.00
Drop forge flashings	54.50 to 55.50
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	32.00 to 33.00
Shoveling turnings	32.00 to 33.00
Cast iron borings	32.00 to 33.00
Low phos. punch'gs, plate	55.00 to 56.00
No. 1 cupola cast.	51.00 to 52.00
Heavy breakable cast.	44.00 to 45.00
Stove plate	45.00 to 46.00
Automotive cast.	54.00 to 55.00

St. Louis

No. 1 hvy. melting	$52.00 to $53.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 bundles	55.00 to 56.00
No. 2 bundles	41.00 to 42.00
Machine shop turn	34.00 to 35.00
Cast iron borings	35.00 to 36.00
Shoveling turnings	35.00 to 36.00
No. 1 RR. hvy. melting	62.50 to 63.50
Rails, random lengths	75.00 to 76.00
Rails 18 in. and under	79.00 to 80.00
Locomotive tires uncut	64.00 to 65.00
Angles and splice bars	68.00 to 69.00
Std. steel car axles	78.00 to 79.00
RR. specialties	66.50 to 67.50
Cupola cast.	52.00 to 53.00
Heavy breakable cast.	43.00 to 44.00
Cast iron brake shoes	50.00 to 51.00
Stove plate	44.00 to 45.00
Cast iron car wheels	53.00 to 54.00
Rerolling rails	89.00 to 90.00
Unstripped motor blocks	43.00 to 44.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$48.00 to $49.00
No. 2 hvy. melting	37.00 to 37.50
No. 1 bundles	48.00 to 49.00
No. 2 bundles	35.00 to 35.50
No. 1 busheling	48.00 to 49.00
Elec. furnace, 3 ft & under	51.00 to 52.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and short turn.	31.00 to 32.00
Shoveling turnings	32.00 to 33.00
Clean cast chem. borings	34.00 to 35.00
No. 1 machinery cast.	45.00 to 46.00
Mixed cupola cast.	40.00 to 41.00
Heavy breakable cast.	44.00 to 45.00
Stove plate	39.00 to 40.00
Unstripped motor blocks	32.00 to 33.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$52.00 to $53.00
No. 2 hvy. melting	43.00 to 44.00
No. 2 bundles	39.00 to 40.00
Machine shop turn.	31.00 to 32.00
Mixed bor. and turn.	31.00 to 32.00
Shoveling turnings	37.00 to 38.00
Clean cast chem. borings	35.00 to 36.00
No. 1 machinery cast.	52.00 to 53.00
Mixed yard cast.	48.00 to 49.00
Charging box cast.	48.00 to 49.00
Heavy breakable cast.	48.00 to 49.00
Unstripped motor blocks	38.00 to 39.00

Birmingham

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	40.00 to 41.00
No. 1 bundles	42.00 to 43.00
No. 2 bundles	34.00 to 35.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	33.00 to 34.00
Shoveling turnings	35.00 to 36.00
Cast iron borings	30.50 to 31.50
Electric furnace bundles	53.00 to 54.00
Bar crops and plate	59.00 to 60.00
Structural and plate, 2 ft.	57.00 to 58.00
No. 1 RR. hvy. melting	56.00 to 57.00
Scrap rails, random lgth.	69.00 to 70.00
Rails, 18 in. and under	74.00 to 75.00
Angles & splice bars	70.00 to 71.00
Rerolling rails	77.00 to 78.00
No. 1 cupola cast.	53.00 to 54.00
Stove plate	51.00 to 52.00
Charging box cast.	40.00 to 41.00
Cast iron car wheels	45.00 to 46.00
Unstripped motor blocks	45.00 to 46.00
Mashed tin cans	15.00 to 16.00
Elec. furnace, 3 ft & under	51.00 to 52.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$56.00 to $57.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 bundles	56.00 to 57.00
No. 2 bundles	41.00 to 42.00
Machine shop turn.	35.00 to 36.00
Mixed bor. and turn.	37.00 to 38.00
Shoveling turnings	39.00 to 40.00
Cast iron borings	37.00 to 38.00
Low phos. 18 in. & under	61.00 to 62.00
Rails, random lengths	69.00 to 70.00
Rails, 18 in. and under	76.00 to 77.00
No. 1 cupola cast.	48.00 to 49.00
Hvy. breakable cast.	47.00 to 48.00
Drop broken cast.	58.00 to 59.00

San Francisco

No. 1 hvy. melting	$55.00
No. 2 hvy. melting	52.00
No. 1 bundles	53.00
No. 2 bundles	43.00
Machine shop turn.	$33.00 to 35.00
Cast iron borings	35.00
No. 1 RR. hvy. melting	55.00
No. 1 cupola cast.	60.00

Los Angeles

No. 1 hvy. melting	$55.00 to $57.00
No. 2 hvy. melting	52.00 to 54.00
No. 1 bundles	53.00
No. 2 bundles	43.00
Machine shop turn.	33.00 to 35.00
Shoveling turnings	38.00
Cast iron borings	35.00
Elec. furn. 1 ft and under (foundry)	61.00
No. 1 RR. hvy. melting	56.00
No. 1 cupola cast.	60.00

Seattle

No. 1 hvy. melting	$55.00
No. 2 hvy. melting	52.00
No. 2 bundles	31.00
No. 1 cupola cast.	55.00
Mixed yard cast.	55.00

Hamilton, Ont.

No. 1 hvy. melting	$52.00
No. 2 hvy. melting	47.00
No. 1 bundles	52.00
No. 2 bundles	42.50
Mixed steel scrap	46.00
Bushelings	39.50
Bush., new fact., prep'd	50.00
Bush., new fact., unprep'd	46.00
Machine shop turn.	28.00
Short steel turn.	34.00
Mixed bor. and turn.	28.00
Rails, rerolling	60.00
Cast scrap	50.00



For Babies and Bridges

The Ninevites made wire in 800 B.C.—other hand-made specimens discovered date as far back as 1700 B.C. The Italians are said to have drawn wire before the tenth century, and in 1565, the draw plate was introduced into England, under permission granted by Queen Elizabeth.

It is not known when the first safety pin was used on a baby, but the first wire suspension bridge in the United States, and probably in the world, was thrown across the Schuylkill River at Philadelphia, in 1816.

Today, millions of miles of steel wire are used, not only for safety pins and suspension bridges, but also for countless other civilian and military requirements. To meet these needs, and for thousands of other steel products, a never-failing supply of scrap must be maintained.

For the purchase or sale of iron or steel scrap . . .

phone or write "Your Chicago Broker"

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COMPANY

231 S. La Salle St., Chicago

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Predict Aluminum's Best Year

Alcoa executive reports 1956 will see records set for both production and shipments of aluminum . . . Bauxite output will be boosted by two new facilities in 1957.

◆ TOTAL ALUMINUM produced domestically in 1956 will be the greatest in the history of the industry, despite losses due to strikes at Aluminum Co. of America and Reynolds Metals. So says Alcoa vice president Lawrence Litchfield, Jr.

Mr. Litchfield predicts that this year's production will top last year's record output by about 100,000 tons. Specifically, this will mean about 1.675 million tons, 7 pct more than the 1,565,721 tons turned out in 1955.

The Alcoa executive expects shipments of aluminum products to consumers to parallel production and also set a new all time record.

He is also sure that mill products shipments will top last year's 2 million ton record by a solid 5 pct, about 100,000 tons, the same amount Mr. Litchfield expects production to be increased.

Mr. Litchfield, who is general manager of Alcoa's mining division, believes U. S. imports of bauxite in 1956 will exceed the all time record of 5,283,888 long tons set in 1954.

Jamaica, which first shipped bauxite in 1952, is now the largest source for ore, reports Mr. Litchfield. During the first half of 1956, 46 pct of the imported ore came from here, 46 pct from Suriname, former leader, and the rest from British Guiana and West Africa.

Two new sources to bolster a supply which does not yet seem to be in need will be brought in next year. Reynolds Metals is completing installations in Haiti. And Alcoa expects to begin operation in the Dominican Republic by the last part of 1957.

COPPER . . . The supply of copper available to consumers during July 1956 was about 144,000 tons, more than double the supply for comparable period a year ago, but off slightly from 167,000 tons available in June.

According to the Copper Div., Business and Defense Services Administration, U. S. Commerce Dept., consumption reached 81,000 tons, leaving 54,000 tons for industrial and government inventories.

Consumption in July, 1956, was 10,000 tons over July 1955. But this does not tell the whole story of increased copper production, since in July, 1955, both government and industrial inventories were sharply reduced.

Receipt and consumption of copper-base scrap was off from the previous month and the comparable month last year, probably because of the increased supply of refined metal.

The current market is generally quiet, with sales volume comparatively light. Status quo is expected to be maintained, at least until major consumers place orders covering November needs.

On the export front, the Bureau of Foreign Commerce, U. S. Commerce Dept., has announced some changes in special licensing requirements for fourth quarter export of copper raw materials.

Exporters no longer need certify as to the foreign or commingled origin of refined copper on their export applications.

Exporters are required to certify that the material, including refined copper produced under toll or conversion agreements, will be available for export during the three month validity period of the license.

Applications under toll or conversion agreement, including copper or copper base alloy scrap, must name the foreign consumer.

ZINC . . . Although grade-by-grade the picture was somewhat hazy, the overall smelter output for September 1956 showed a slight increase from the previous month, while stock on hand at the end of the month was off slightly.

The 90,235 tons produced in September was less than 1000 tons over the 89,545 tons turned out in August.

The 102,165 tons at the smelters at the end of the month was more than 2000 tons less than the 104,307 tons at the beginning of September.

Responsible for the increased output was prime western intermediate, and special high grade, all of which were up slightly.

The same formula applied to stocks on hand, as high grade was the only grade of which smelters had more in stock at the end of September.

Both domestic shipments and unfilled orders were up to 73,142 tons and 64,450 tons respectively.

TIN . . . There seems to be a cycle of events which affects the tin market. The most regularly occurring influence is the threat of strike by Malayan miners, smelter workers or dock workers. This time it is the miners, and as usual the news of the strike possibility gave the price a slight boost.

An industrial court in Malaya decided against the Mining Employees Union demand for payments for weekly rest days retroactive to November 1954. This is the same issue which poised the threat of a strike several times before the union agreed to mediation,

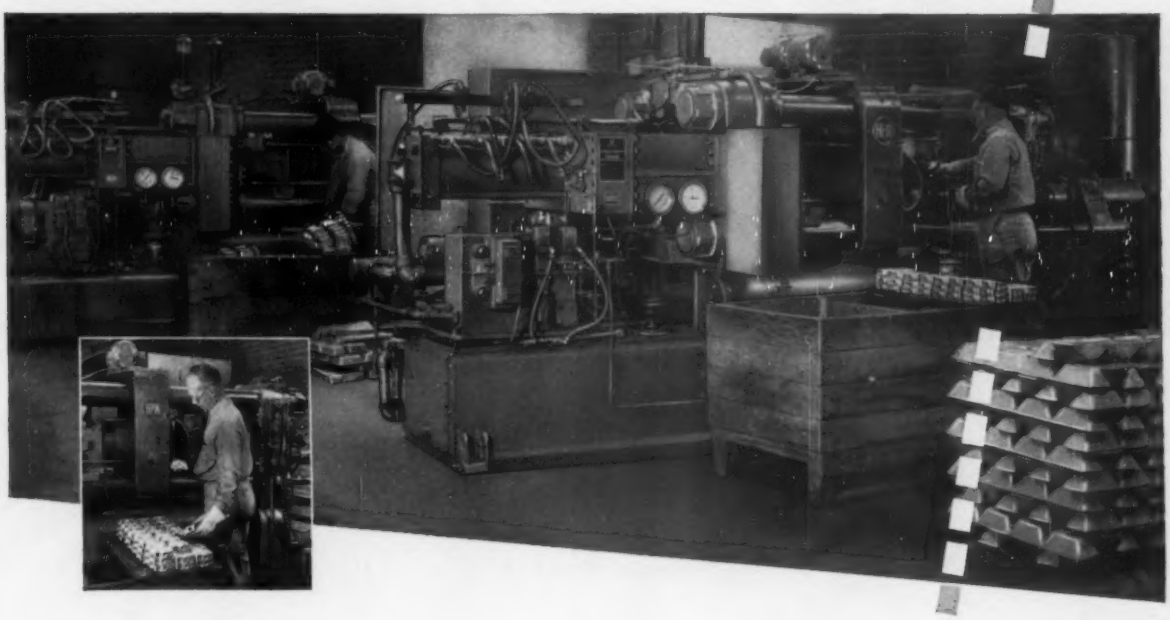
Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Oct. 3	Oct. 4	Oct. 5	Oct. 6	Oct. 8	Oct. 9
Copper, electro, Conn.	40.00	40.00	40.00	40.00	40.00	40.00
Copper, Lake, delivered	40.00	40.00	40.00	40.00	40.00	40.00
Tin, Straits, New York	103.375	104.00	104.875	....	104.25	104.00*
Zinc, East St. Louis	13.50	13.50	13.50	13.50	13.50	13.50
Lead, St. Louis	15.80	15.80	15.80	15.80	15.80	15.80

Note: Quotations are going prices. **Tentative*

PRESSURE-TIGHT CASTINGS

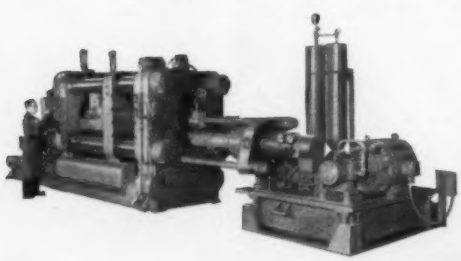


H-P-M Die Casting Machine "Locks Up Tight" For Valve Bodies of Consistent Density

When this H-P-M Die Casting Machine closes the two-cavity mold and metal is shot into intricate dies, each having cores on full three sides, the superior features of H-P-M's mechanical link wedge closing mechanism are convincingly tested. Mr. W. L. Chapman, President of The W. L. Chapman Co., Pasadena, Calif., one of the West Coast's most rapidly expanding die casting operations, says:

"These valve bodies have intricate coring detail on all sides and it takes a machine that locks up tight to produce leakproof, pressure-tight castings. One by one we are replacing all machines in our shop with H-P-Ms. We have two in operation and another on order."

Have you investigated thoroughly the production advantages of the new H-P-M Die Casting Machines? You won't have to pass up the tough jobs. Put them on an H-P-M . . . profitably!



If you have a tendency to back away from the tough ones, take a look at the new H-P-Ms. They're built to produce to the most exacting demands of you or your customer.

HPM

THE HYDRAULIC PRESS MFG. CO.

Mount Gilead, Ohio, U.S.A.

A DIVISION OF KOEHRING COMPANY

Nonferrous Prices *(Effective Oct. 9, 1956)*

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136–.249	.250–3.
1800, 1100, 3003	44.3	42.1	40.9	40.2
5052	51.8	46.8	45.1	42.9
6061–0	48.9	44.6	42.8	42.6

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6– 8	45.5–47.3	61.3–65.1
12–14	46.2–47.7	62.2–66.8
24–26	49.4–49.5	73.1–77.8
36–38	58.3–59.0	97.4–101.0

Screw Machine Stock—2011-T-3

Size"	¼	⅜–⅝	¾–1	1¼–1½
Price	59.7	58.8	57.4	55.2

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.352	$1.803	$2.254	$2.704
.024 gage	1.686	2.252	2.815	3.378

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type→ Gage→	.250–3.00	.250–2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	95.7	108.7	171. 3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade (AZ31C)	69.6	70.7	75.6	89.2
Spec. Grade (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting) ..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	113	97	118
Strip, CR	111	99	128
Rod, bar, HR	94	80	99
Angles, HR	94	80	99
Plates, HR	107	96	111
Seamless tube	144	120	190
Shot, blocks	...	78	...

COPPER, BRASS, BRONZE

(Freight included on 500 lbs)

	Sheet	Wire	Rod	Tube
Copper	61.63	.....	.....	61.82
Brass, 70/30	52.10	52.64	.....	55.01
Brass, Low	55.85	56.39	55.75	58.66
Brass, R L	57.19	57.73	57.13	60.00
Brass, Naval	55.72	.....	50.03	58.88
Muntz Metal	53.84	47.85	49.65	.....
Comm. Bz.	59.08	59.62	59.02	61.64
Mang. Bz.	59.46	.....	53.56	.....
Phos. Bz. 5%	79.58	.....	80.08	.....

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $12.10-$12.60; alloy, $15.00-$15.75; Plate, HR, commercially pure, $10.00-$10.50; alloy, $11.50-$12.00. Wire, rolled and/or drawn, commercially pure, $9.00-$11.50; alloy, $11.50; Bar, HR or forged, commercially pure, $7.55-$7.80; alloy, $7.55-$7.75.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb. freight allowed	27.10
Aluminum pig	25.00
Antimony, American, Laredo, Tex.	33.50
Beryllium copper, per lb conta'd Be.	$43.00
Beryllium aluminum 5% Be, Dollars per lb contained Be	$74.75
Bismuth, ton lots	$ 2.25
Cadmium, del'd	$ 1.70
Cobalt, 97-99% (per lb)	$2.60 to $2.67
Copper, electro, Conn. Valley	40.00
Copper, Lake, delivered	40.00
Gold, U. S. Treas., per troy oz.	$35.00
Indium, 99.9% dollars per troy oz.	$ 2.25
Iridium, dollars per troy oz.	$90 to $100
Lead, St. Louis	15.80
Lead, New York	16.00
Magnesium, 99.8+%, f.o.b. Velasco, Tex., 10,000 lb, pig	35.25
ingot	36.00
Magnesium, sticks, 100 to 500 lb.	59.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$255 to $257
Nickel electro	64.50
Nickel oxide sinter at Copper Cliff, Ont., contained nickel	60.75
Palladium, dollars per troy oz.	$23 to $24
Platinum, dollars per troy oz.	$103 to $105
Silver, New York, cents per troy oz.	91
Tin, New York	104.00*
Titanium sponge, grade A-1,	$2.70 to $3.00
Zinc, East St. Louis	13.50
Zinc, New York	14.00
Zirconium sponge	$10.00

*Tentative.

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot	
No. 115	37.75
No. 120	36.50
No. 123	35.00
80-10-10 ingot	
No. 305	41.00
No. 315	39.25
88-10-2 ingot	
No. 210	52.75
No. 215	48.50
No. 245	43.50
Yellow ingot	
No. 405	29.75
Manganese bronze	
No. 421	33.00

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper max.	27.25-28.00
0.60 copper max.	27.00-27.75
Piston alloys (No. 122 type)	26.75-27.75
No. 12 alum. (No. 2 grade)	25.50-26.00
108 alloy	25.50-26.00
195 alloy	27.00-28.00
13 alloy (0.60 copper max.)	27.00-28.00
AXS-679	25.50-26.00

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97½%	26.00-26.50
Grade 2—92-95%	25.00-25.50
Grade 3—90-92%	24.00-24.50
Grade 4—85-90%	23.50-24.00

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	36	35¼
Yellow brass	27¼	25⅛
Red brass	31⅞	31⅛
Comm. bronze	33⅛	32⅜
Mang. bronze	25¼	24½
Yellow brass rod ends	27	....

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	32½
No. 2 copper wire	31
Light copper	28¾
*Refinery brass	29

*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	32½
No. 2 copper wire	31
Light copper	28¾
No. 1 composition	30
No. 1 comp. turnings	29½
Hvy. yellow brass solids	21
Brass pipe	21¾
Radiators	23½

Aluminum

Mixed old cast	17	—17½
Mixed new clips	18	—18½
Mixed turnings, dry	17	—17½

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	30	—30½
No. 2 copper wire	28	—28½
Light copper	25¾	—26¼
Auto radiators (unsweated)	19	—19½
No. 1 composition	25½	—26
No. 1 composition turnings	24	—24½
Cocks and faucets	19	—19½
Clean heavy yellow brass	17	—17½
Brass pipe	20½	—21
New soft brass clippings	22	—22½
No. 1 brass rod turnings	19½	—20½

Aluminum

Alum. pistons and struts	7½— 8
Aluminum crankcases	12½—13
1100 (2S) aluminum clippings	15½—16
Old sheet and utensils	12½—13
Borings and turnings	8½— 9
Industrial castings	12½—13
2024 (24S) clippings	14 —14½

Zinc

New zinc clippings	7 — 7½
Old zinc	4½— 5
Zinc routings	2¾— 3
Old die cast scrap	2½— 2¾

Nickel and Monel

Pure nickel clippings	$1.85-$1.95
Clean nickel turnings	$1.55-$1.65
Nickel anodes	$1.85-$1.95
Nickel rod ends	$1.85-$1.95
New Monel clippings	80-90
Clean Monel turnings	70-80
Old sheet Monel	70-80
Nickel silver clippings, mixed	21
Nickel silver turnings, mixed	18

Lead

Soft scrap lead	12½—13
Battery plates (dry)	7 — 7¼
Batteries, acid free	4½

Miscellaneous

Block tin	80 —81
No. 1 pewter	62½—63
Auto babbitt	42 —42½
Mixed common babbitt	13 —13½
Solder joints	18 —18½
Siphon tops	42
Small foundry type	15¼—15½
Monotype	14½—15
Lino. and stereotype	13 —13½
Electrotype	12½—12¾
Hand picked type shells	10 —10½
Lino. and stereo. dross	5¼— 5¾
Electro. dross	4¼— 4½

IRON AGE

STEEL PRICES

(Effective Oct. 9, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$107.00 *B3*		5.85 *B3*	7.40 *B3*	5.95 *B3*						
	Buffalo, N. Y.	$74.00 *B3, R3*	$91.50 *B3, R3*	$107.00 *B3, R3*	5.90 *B3*	5.85 *B3*	7.40 *B3*	5.95 *B3*	4.875 *B3, R3*	6.85 *R7*	6.95 *B3*			
	Claymont, Del.													14.55 *C11*
	Harrison, N. J.													
	Conshohocken, Pa.		$96.50 *A2*	$114.00 *A2*					4.725 *A2*	6.90 *A2*	6.95 *A2*			
	New Bedford, Mass.									7.30 *R6*				
	Johnstown, Pa.	$74.00 *B3*	$91.50 *B3*	$107.00 *B3*		5.85 *B3*	7.40 *B3*							
	Boston, Mass.									7.40 *T8*				14.90 *T8*
	New Haven, Conn.									7.30 *D1*				
	Baltimore, Md.									6.85 *T8*				
	Phoenixville, Pa.					5.85 *P2*		5.85 *P2*						
	Sparrows Pt., Md.								4.875 *B3*		6.95 *B3*			
	Bridgeport, Wallingford, Conn.	$79.00 *N8*	$96.50 *N8*	$107.00 *N8*						7.30 *W1* 6.95 *T8*				
	Pawtucket, R. I. Worcester, Mass.									7.40 *A3,N7*				14.90 *N7*
MIDDLE WEST	Alton, Ill.								4.875 *L1*					
	Ashland, Ky.								4.875 *A7*					
	Canton-Massillon, Dover, Ohio		$94.00 *R3*	$107.00 *R3 T5*						6.85 *G4*		10.10 *G4*		14.55 *G4*
	Chicago, Ill. Franklin Park, Ill.	$74.00 *U1, R3*	$91.50 *U1, R3,W8*	$107.00 *U1, R3,W8*	5.90 *U1*	5.00 *U1, W8*	7.35 *U1, Y1* 6.00 *W8*	5.00 *U1*	4.875 *N4* 4.875 *A1*	6.95 *A1,T8*			7.75 *W8, S9*	14.55 *A1, S9,T8*
	Cleveland, Ohio									6.85 *A3,J3*			7.75 *J3*	
	Detroit, Mich.	$74.00 *R5*		$107.00 *R5*					4.775 *G3, M3*	6.95 *M2,G3, D2,P11*	7.05 *G3*	10.10 *G3, S1,D2*	7.05 *G3*	
	Anderson, Ind.									6.85 *G4*		10.10 *G4*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$74.00 *U1*	$91.50 *U1*	$107.00 *U1, Y1*	5.90 *I3*	5.00 *U1*	7.35 *U1, I3*	5.00 *I3*	4.875 *U1, I3, Y1*	6.85 *Y1*	6.95 *U1, I3, Y1*	10.20 *Y1*	7.75 *U1, Y1*	
	Sterling, Ill.	$74.00 *N4*							4.775 *N4*					
	Indianapolis, Ind.									7.00 *C9*				
	Newport, Ky.												7.75 *N5*	
	Middletown, Ohio													
	Niles, Warren, Ohio Sharon, Pa.		$91.50 *S1, C10*	$107.00 *S1 C10*					4.875 *S1, R3*	6.85 *T4*	6.95 *S1, R3*	10.00 *S1, R3*	7.75 *S1*	14.55 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$74.00 *U1, J3*	$91.50 *U1, J3, C11*	$107.00 *U1, C11*	5.90 *U1*	5.00 *U1, J3*	7.35 *U1, J3*	5.00 *U1*	4.875 *P8*	5.750 *P8* 6.85 *J3,B4, S7*			7.75 *S9*	14.55 *S9*
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.					5.00 *W3*			4.875 *W3*	6.85 *W3,F3*	6.95 *W3*	9.65 *W3*		
	Youngstown, Ohio	$74.00 *R3*	$91.50 *Y1, C10*	$107.00 *Y1*		5.00 *Y1*	7.35 *Y1*		4.875 *U1, Y1*	6.85 *Y1,C9*	6.95 *U1, Y1*	10.20 *Y1*	7.75 *U1, Y1*	
WEST	Fontana, Cal.	$83.50 *K1*	$101.00 *K1*	$128.00 *K1*		5.70 *K1*	8.05 *K1*	5.95 *K1*	5.475 *K1*	8.00 *K1*				
	Geneva, Utah	$91.50 *C7*				5.00 *C7*	7.35 *C7*							
	Kansas City, Mo.					5.10 *S2*	7.45 *S2*		4.933 *S2*		7.20 *S2*			
	Los Angeles, Torrance, Cal.		$101.00 *B2*	$127.00 *B2*		5.70 *C7, B2*	8.05 *B2*		5.425 *B2 C7*	8.50 *C1*			8.95 *B2*	
	Minnequa, Colo.					5.30 *C6*			5.775 *C8*					
	Portland, Ore.					5.75 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$101.00 *B2*			5.65 *B2*	8.00 *B2*		5.425 *C7,B2*					
	Seattle, Wash.		$105.00 *B2*			5.75 *B2*	8.10 *B2*		5.675 *B2*					
SOUTH	Atlanta, Ga.								4.875 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$74.00 *T2*	$91.50 *T2*			5.00 *T2,R3* 5.30 *C16*	7.35 *T2*		4.875 *T2,R3* 4.975 *C10*		6.95 *T2*			
	Houston, Lone Star, Texas	$80.00 *L3*	$96.50 *S2*	$112.00 *S2*		5.10 *S2*	7.45 *S2*		4.925 *S2*		7.20 *S2*			

STEEL PRICES

(Effective Oct. 9, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Cokes* *1.25*-lb. base box	Electro* *0.25*-lb. base box	Hollowware Enameling *20* ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.675 *B3*	5.75 *B3*				6.90 *B3*	8.525 *B3*			5.80 *W6*	† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.													
	Centreville, Pa.													
	Conshohocken, Pa.	4.725 *A2*	5.80 *A2*				6.95 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										5.80 *B3*			
	Fairless, Pa.	4.725 *U1*	5.80 *U1*				6.95 *U1*	8.575 *U1*				$9.70 *U1*	$8.40 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.675 *B3*	5.75 *B3*	6.30 *B3*			6.90 *B3*	8.575 *B3*	9.275 *B3*		5.90 *B3*	$9.70 *B3*		
	Worcester, Mass.										6.10 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										6.00 *L1*			
	Ashland, Ky.	4.675 *A7*		6.30 *A7*	6.325 *A7*									
	Canton-Massillon, Dover, Ohio			6.30 *R3,R1*										
	Chicago, Joliet, Ill.	4.675 *W8, A1*					6.90 *U1*			5.80 *K2*	5.80 *A5,R3, N4,W8,K2*			
	Sterling, Ill.										5.90 *N4,K2*			
	Cleveland, Ohio	4.675 *J3, R3*	5.75 *J3, R3*		6.325 *R3*		6.90 *R3*	8.525 *R3, J3*			5.80 *A5*			
	Detroit, Mich.	4.775 *G3, M2*	5.85 *G3* 5.75 *M2*				7.00 *G2*	8.625 *G3*						
	Newport, Ky.	4.675 *N5*	5.75 *N5*											
	Gary, Ind. Harbor, Indiana	4.675 *U1, I3,Y1*	5.75 *U1, I3,Y1*	6.30 *U1, I3*	6.325 *U1, I3,Y1*	6.70 *U1*	6.90 *U1, Y1,I3*	8.525 *U1, Y1*			5.80 *Y1*	$9.60 *U1, Y1*	$8.30 *I3, U1,Y1*	7.15 *U1, Y1*
	Granite City, Ill.	4.875 *G2*	5.95 *G2*	6.50 *G2*	6.525 *G2*								$8.40 *G2*	7.25 *G2*
	Kokomo, Ind.			6.40 *C9*							5.90 *C9*			
	Mansfield, Ohio		5.75 *E2*			6.70 *E2*								
	Middletown, Ohio		5.75 *A7*	6.30 *A7*	6.325 *A7*	6.70 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	4.675 *S1, R3, N3*	5.75 *R3*	6.30 *R3*	6.325 *N3*	6.70 *N3*	6.90 *S1, R3*	8.525 *S1, R3*					8.30 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.675 *U1, J3,P6*	5.75 *U1, J3,P6*	6.30 *U1, J3*	6.325 *U1*		6.90 *U1, J3,R3*	8.525 *U1, J3*	9.275 *U1*		5.80 *A5, P6,J3*	$9.60 *J3, U1*	$8.30 *U1*	7.15 *U1*
	Portsmouth, Ohio	4.675 *P7*	5.75 *P7*								5.80 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.675 *W3, W5*	5.75 *W3, W5,F3*	6.30 *W3, W5*		6.70 *W3, W5*	6.90 *W3*	8.525 *W3*				$9.60 *W5*	$8.30 *W5*	7.15 *W5* 7.60 *W3*
	Youngstown, Ohio	4.675 *U1, Y1*	5.75 *Y1*		6.325 *Y1*		6.90 *Y1*	8.525 *Y1*			5.80 *Y1*			7.15 *Y1*
WEST	Fontana, Cal.	5.475 *K1*	6.95 *K1*				7.70 *K1*	9.725 *K1*				$10.35 *K1*	$9.05 *K1*	
	Geneva, Utah	4.775 *C7*												
	Kansas City, Mo.										6.05 *S2*			
	Los Angeles, Torrance, Cal.										6.60 *B2*			
	Minnequa, Colo.										6.05 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.375 *C7*	6.70 *C7*	7.05 *C7*							6.45 *C7*	$10.35 *C7*	$9.05 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.675 *T2, R3*	5.75 *T2*	6.30 *T2, R3*							5.80 *T2,R3*	$9.70 *T2*	$8.40 *T2*	
	Houston, Tex.										6.05 *S2*			

IRON AGE

STEEL PRICES

(Effective Oct. 9, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem				6.125 *B3*	8.325 *B3*	7.40 *B3*					
	Buffalo, N. Y.	5.075 *B3,R3*	5.075 *B3,R3*	6.90 *B5*	6.125 *B3,R3*	8.325 *B5,B3*	7.40 *B3*	4.85 *B3*				7.20 *W6*
	Claymont, Del.							5.35 *C4*		6.85 *C4*	7.55 *C4*	
	Coatesville, Pa.							5.25 *L4*		6.85 *L4*	7.55 *L4*	
	Conshohocken, Pa.							4.90 *A2*	5.025 *A2*	6.25 *A2*	7.25 *A2*	
	Harrisburg, Pa.							5.80 *P2*	6.275 *C3*			
	Hartford, Conn.			7.35 *R3*		8.625 *R3*	7.40 *B3*					
	Johnstown, Pa.	5.075 *B3*	5.075 *B3*		6.125 *B3*			4.85 *B3*		6.85 *B3*	7.25 *B3*	7.20 *B3*
	Fairless, Pa.	5.225 *U1*	5.225 *U1*		6.275 *U1*							
	Newark, N. J.			7.30 *W10*		8.50 *W10*						
	Camden, N. J.			7.30 *P10*		8.50 *P10*						
	Bridgeport, Conn.	5.30 *N8*	5.30 *N8*	7.20 *N8* 7.40 *W10*	6.20 *N8*	8.475 *N8*	7.50 *N8*					
	Sparrows Pt., Md.		5.075 *B3*					4.85 *B3*		6.85 *B3*	6.85 *B3*	7.30 *B3*
	Palmer, Worcester, Readville, Mass. Milton, Pa.	5.225 *M7*	5.225 *M7*	7.40 *B5,C14*		8.325 *A5* 8.625 *B5*						7.50 *A5,W6* 9.025 *T8*
	Spring City, Pa.			7.30 *K4*		8.50 *K4*						
MIDDLE WEST	Alton, Ill.	5.275 *L1*										7.40 *L1*
	Ashland, Newport, Ky.							4.85 *A7,N5*		6.85 *N5*		
	Canton-Massillon, Ohio			6.85 *R3,R2*	6.125 *R3,T5*	8.325 *R3,R2,T5*						
	Chicago, Joliet, Ill.	5.075 *U1,R3,W8,N4* 5.575 *P13*	5.075 *U1,R3,N4* 5.575 *P13*	6.85 *A5,B5,W10,L2,W8,L2,N9*	6.125 *U1,R3,W8*	8.325 *A5,B5,W8,L2,N9,W10*	5.875 *W8*	4.85 *U1,I3,W8,A1*	5.925 *U1*	6.85 *U1,W8*	7.25 *U1*	7.20 *A5,K2,R3,N4,W7*
	Cleveland, Ohio	5.075 *R3*	5.075 *R3*	6.85 *A5,C13*		8.325 *A5,C13*	7.425 *R3*	4.95 *J3,R3*	5.925 *J3*		7.25 *J3,R3*	7.20 *A5,C13*
	Detroit, Mich.	5.175 *G3*	5.425 *G3*	7.05 *B5,P8* 7.10 *P3* 6.85 *R5*	6.225 *G3* 6.125 *R5*	8.525 *B5,P3,P8* 8.325 *R5*	7.525 *G3*	4.95 *G3*		6.90 *G3*		
	Duluth, Minn.											7.20 *A5*
	Gary, Ind. Harbor, Crawfordsville	5.075 *U1,I3,Y1*	5.075 *U1,I3,Y1*	6.85 *R3,M5*	6.125 *U1,I3,Y1*	8.325 *R3,M4*	7.425 *U1,I3,Y1*	4.85 *U1,I3,Y1*	5.925 *I3*	6.85 *U1,Y1*	7.25 *U1,Y1*	7.30 *M4*
	Granite City, Ill.							5.05 *G2*				
	Kokomo, Ind.											7.30 *C9*
	Sterling, Ill.	5.525 *N4*	5.175 *N4*									7.30 *K2*
	Niles, Warren, Ohio Sharon, Pa.			6.85 *C11*	6.125 *C10,S1*	8.325 *C10*	7.425 *S1*	4.85 *S1,R3*		6.85 *S1*	7.25 *S1,R3*	
	Pittsburgh, Pa. Midland, Pa.	5.075 *U1, C11,J3*	5.075 *U1,J3*	6.85 *A5,C8, C11,J3,R3, S9,B4,W10*	6.125 *U1,C11*	8.325 *A5,R3, S9,C8,W10*	7.425 *U1,J3*	4.85 *U1,J3*	5.925 *U1*	6.85 *U1,J3*	7.25 *U1,J3*	7.20 *A5,J3, P6*
	Portsmouth, Ohio											7.20 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							4.85 *W5*				
	Youngstown, Ohio	5.075 *U1, Y1,R3*	5.075 *U1, Y1,R3*	6.85 *U1,Y1, F1*	6.125 *U1,Y1*	8.325 *Y1,F2*	7.425 *U1,Y1*	4.85 *U1,Y1, R3*		6.85 *Y1*	7.25 *Y1*	7.20 *Y1*
WEST	Emeryville, Cal.	5.825 *J5*	5.825 *J5*									
	Fontana, Cal.	5.775 *K1*	5.775 *K1*		7.175 *K1*		8.125 *K1*	5.55 *K1*		7.55 *K1*	7.95 *K1*	
	Geneva, Utah	5.175 *C7*						4.85 *C7*			7.25 *C7*	
	Kansas City, Mo.	5.325 *S2*	5.325 *S2*		6.375 *S2*		7.675 *S2*					7.45 *S2*
	Los Angeles, Torrance, Cal.	5.775 *C7,B2*	5.775 *C7,B2*	8.30 *R3*	7.175 *B2*		8.125 *B2*					8.15 *B2*
	Minnequa, Colo.	5.525 *C6*	5.525 *C6*					5.70 *C6*				7.45 *C6*
	Portland, Ore.	5.825 *O2*	5.825 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	5.775 *C7,P9* 5.825 *B2*	5.775 *C7,P9* 5.825 *B2*				8.175 *B2*					8.15 *C7,C6*
	Seattle, Wash.	5.825 *B2* 5.825 *N6*	5.825 *B2*				8.175 *B2*	5.75 *B2*		7.75 *B2*	8.15 *B2*	
SOUTH	Atlanta, Ga.	5.575 *A8*										7.40 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	5.075 *T2, R3* 5.375 *C16*	5.075 *T2, R3* 5.375 *C16*				7.425 *T2*	4.85 *T2, R3*			7.25 *T2*	7.20 *T2,R3*
	Houston, Ft. Worth, Lone Star, Tex.	5.325 *S2*	5.325 *S2*		6.375 *S2*		7.675 *S2*	4.95 *S2* 5.20 *L3*		6.95 *S2*	7.35 *S2*	7.45 *S2*

Steel Prices *(Effective Oct. 9, 1956)*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metals Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Conners Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
D5 Henry Disston Div., Philadelphia

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Dearborn Div., Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ in.		¾ in.		1 in.		1¼ in.		1½ in.		2 in.		2½-3 in.		2 in.		2½ in.		3 in.		3½-4 in.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75								
Youngstown *R3*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75								
Fontana *K1*	0.00	+15.25	3.00	+11.25	5.50	+7.75	8.00	+7.00	8.50	+6.00	9.00	+5.50	10.50	+5.75								
Pittsburgh *J3*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25
Alton, Ill. *L1*	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75								
Sharon *M3*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75								
Fairless *N2*	10.50	+4.75	13.50	+0.75	16.00	2.75	18.50	3.50	19.00	4.50	19.50	5.00	21.00	4.75								
Pittsburgh *N1*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25
Wheeling *W5*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75								
Wheatland *W4*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75								
Youngstown *Y1*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25
Indiana Harbor *Y1*	11.50	+5.75	14.50	1.25	17.00	3.75	19.50	4.50	20.00	5.50	20.50	6.00	22.00	5.75								
Lorain *N2*	12.50	+2.75	15.50	1.25	18.00	4.75	20.50	5.50	21.00	6.50	21.50	7.00	23.00	6.75	+2.00	+17	4.50	+12.25	7.00	+9.75	8.50	+8.25
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75								
Youngstown *R3*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75								
Fairless *N2*	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75								
Fontana *K1*	4.50	.....	8.50	.....	10.50	.....	11.00	.....	11.50	.....	12.00	.....	12.50	.....								
Pittsburgh *J3*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25
Alton, Ill. *L1*	15.00	1.25	19.00	5.25	21.00	8.75	21.50	7.50	22.00	8.50	22.50	9.00	23.00	7.75								
Sharon *M3*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75								
Pittsburgh *N1*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25
Wheeling *W5*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75								
Wheatland *W4*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75								
Youngstown *Y1*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25
Indiana Harbor *Y1*	16.00	2.25	20.00	6.25	22.00	9.75	22.50	8.50	23.00	9.50	23.50	10.00	22.00	9.75								
Lorain *N2*	17.00	3.25	21.00	7.25	23.00	10.75	23.50	9.75	24.00	10.50	24.50	11.00	25.00	9.75	+0.50	+14.50	7.00	+8.75	9.50	+6.25	14.50	+1.25

Threads only, buttweld and seamless 2½ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½" and 3" pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb.

To identify producers, see Key on preceding page

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.68	T-1
18	4	1	—	5	2.385	T-4
18	4	2	—	—	1.845	T-2
1.5	4	1.5	8	—	1.04	M-1
6	4	2	8	—	1.43	M-3
6	4	2	5	—	1.185	M-2

High-carbon chromium	.83 D-3, D-5
Oil hardened manganese	.45 O-2
Special carbon	.41 W-1
Extra carbon	.345 W-1
Regular carbon	.29 W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*A3, J2, L6*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	304	34.60	38.00	41.50	
	316	39.70	43.20	46.65	
	321	36.35	39.80	43.50	
	347	39.50	43.95	48.45	
	405	29.20	33.15	37.05	
	410, 430	28.70	32.65	36.55	

CR Strip (S9) Copper, 10 pct, 2 sides, 41.40; 1 side, 33.60.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	9.00	9.20	....
Armature	10.35	10.35	10.85
Elect.	11.00	11.025	11.525
Motor	12.05	12.075	12.575
Dynamo	13.05	13.05	13.55
Trans. 72	14.05	14.05	14.55
Trans. 65	14.60		
		Grain Oriented	
Trans. 58	15.10	Trans. 80	18.50
Trans. 52	16.15	Trans. 73	19.00

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E7*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*) (20¢ higher, HR); Zanesville, Butler (*A7*).

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1956 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.10
Old range, bessemer	11.25
Old range, nonbessemer	11.10
Mesabi, bessemer	11.00
Mesabi, nonbessemer	10.85
High phosphorus	10.85

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence 9–15½ ga. Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	167	181	...	195	187	8.10	8.50
Aliquippa, Pa. *J3*	167	184	...	...	184	8.10	8.65
Atlanta *A8*	169	187	...	197	193	8.20	8.80
Bartonville *K2**	169	187	...	197	193	8.20	8.80
Buffalo *W6*	...	...	...	...	...	8.10	8.50
Chicago, Ill. *N4***	167	185	167	195	191	8.10	8.70
Cleveland *A6*	173	...	...	...	...	8.10	....
Cleveland *A5*	...	...	...	...	...	7.95	....
Crawfordsville *M4**	169	187	...	190	184	7.95	8.35
Donora, Pa. *A5*	164	176	...	195	187	8.10	8.50
Duluth *A5*	164	176	...	190	184	7.95	8.35
Fairfield, Ala. *T2*	167	181	...	195	187	8.10	.....
Galveston *D4*	169‡	...	...	...	...	...	.....
Houston *S2*	172	186	...	200	192	8.35	8.75
Johnstown, Pa. *B3**	167	185	167	...	191	8.10	8.70
Joliet, Ill. *A5*	164	176	...	190	184	7.95	8.35
Kokomo, Ind. *C9*	169	183	...	197	189	8.20	8.60
Los Angeles *B2**	...	...	...	...	...	9.05	9.65
Kansas City *S2*	172	186	...	200	192	8.35	8.75
Minnequa *C6*	172	186*	172	200	192*	8.35	8.75
Monessen *P6*	167	185	...	...	191	8.10	8.10
Pittsburg, Cal. *C7*	186	204	...	...	207	9.05	9.45
Portsmouth *P7*	...	...	...	...	...	8.10	.....
Rankin, Pa. *A5*	164	176	...	...	184	7.95	8.35
So. Chicago *R3*	167	181	...	195	187	8.10	8.50
S. San Francisco *C6*	...	...	...	219	...	9.05	9.45
Sparrows Pt. *B3**	...	...	...	197	193	8.20	8.80
Struthers, O. *Y1*	...	...	...	...	...	8.10	8.60
Worcester *A5*	170	...	...	...	...	8.25	8.65
Williamsport, Pa. *S5*	...	...	175	...	...	...	.....

Galvanized products computed with zinc at 5¢ per lb. Exceptions: * zinc at 12.5¢ per lb; ** 13½¢ zinc.

‡—Wholesalers only.

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery ‡ Charge	Sheets: Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Strip: Hot-Rolled	Cold-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled	Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		8.07	9.27	9.83	8.16	.....	8.40	8.44	8.30	10.14	.....	.....	.....	.....
Baltimore	$.10	7.79	9.54	9.12	8.27	.....	8.12	8.57	8.34	9.09	14.99	14.44	18.39	18.09
Birmingham	.15	7.68	8.88	8.85	7.78	.....	8.01	8.05	7.91	10.04	.....	.....	.....	.....
Boston	.10	8.70–8.80	9.73–9.83	10.83–11.02	8.79–8.89	.....	8.95–9.08	8.90–9.00	8.88–8.98	10.71–10.81	15.05	14.45	18.51	18.10
Buffalo	.15	7.90	9.05	10.67	8.15	.....	8.40	8.40	8.15	8.85	15.00	14.45	18.40	.....
Chicago	.15	7.70–7.85	8.88–9.05	9.85	7.78–7.93	.....	8.01–8.16	8.05–8.20	7.91–8.06	8.35–8.50	14.65	14.10	18.05	17.75
Cincinnati	.15	7.97	9.04	9.85	8.21	.....	8.49	8.70	8.34	8.97	14.93	14.38	18.33	18.03
Cleveland	.15	7.83	9.03	9.75	8.03	.....	8.36	8.53	8.14	8.75	14.73	14.18	18.13	17.83
Denver		9.55	11.09	12.41	9.70	.....	9.80	9.60	9.75	10.54	.....	.....	.....	19.79
Detroit	.15	8.06	9.28	10.17	8.25	.....	8.48	8.70	8.33	8.83	.....	14.04	.....	17.09
Houston		8.70	9.65	.....	8.80	.....	8.60	8.90	8.95	10.55	15.50	.....	19.30	19.05
Kansas City	.20	8.52	9.72	10.07	8.60	.....	8.83	8.87	8.73	9.42	15.32	14.77	18.72	18.42
Los Angeles	.10	9.00	10.75	11.75	9.20	.....	9.45	9.05	8.90	11.80	15.85	15.35	19.70	19.45
Memphis	.15	8.02	9.22	.....	8.12	.....	8.35	8.39	8.25	9.85	.....	.....	.....	.....
Milwaukee	.15	7.97	9.17	9.97	8.05	.....	8.28	8.39	8.18	8.72	14.77	.....	18.17	17.87
New York	.10	8.45	9.63	10.33	8.91	.....	8.88	8.84	8.93	10.71	15.02	14.47	18.42	18.12
Norfolk	.20	8.80	.....	.....	8.40	.....	8.35	8.70	8.45	10.70	.....	.....	.....	.....
Philadelphia	.10	7.89–7.99	9.08–9.18	9.66–10.22	8.58–8.68	.....	8.28–8.38	8.38–8.48	8.37–8.47	9.12–9.22	14.80	14.15–14.25	18.20	17.90
Pittsburgh	.15	7.83	9.03	10.20	8.03**	.....	8.16	8.20	8.06	8.75	14.65	13.80–14.10	18.05	16.85–17.75
Portland		8.90	9.65	11.40	9.05	.....	8.70	8.90	8.95	13.55	16.70	16.10	20.40	20.25
San Francisco	.10	8.85	10.40	10.90	9.05	.....	8.95	8.95	8.90	12.40	15.85	15.35	19.70	19.45
Seattle	.80	9.35	11.20	11.55	9.50	.....	9.05	9.15	9.30	13.15	16.10	15.55	19.50	19.28
St. Louis	.15	8.02–8.17	9.16–9.36†	10.03–10.18	8.11–8.26	.....	8.34–8.49	8.43–8.63	8.25–8.40	8.93–9.08	14.83–14.98	14.28	18.23–18.38	17.93
St. Paul	.15	8.44	9.64	10.46	8.54	.....	8.86	8.90	8.67	9.36	.....	14.62	.....	18.27

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

** F.O.B. Plant, warehouse price. † 16 gage. ‡ Deduct for country delivery.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Baltimore, Md. *T8*	8.25	10.10	12.90	15.30	18.25
Bristol, Conn. *W12*	...	...	12.90	15.30	18.25
Boston *T8*	8.50	10.10	12.90	15.30	18.25
Buffalo, N. Y. *R7*	7.95	9.80	12.60	15.00	17.95
Carnegie, Pa. *S9*	‡	9.80	12.60	15.00	.....
Cleveland *A5*	7.95	9.80	12.60	15.00	17.95
Detroit *D1*	8.05	9.90	12.70	15.10	.....
Detroit *D2*	8.05	9.90	12.70	...	.....
Dover, O. *G4*	7.95	9.80	12.60	15.00	17.95
Franklin Park, Ill. *T8*	8.05	9.80	12.60	15.00	17.95
Harrison, N. J. *C11*	...	...	12.90	15.30	18.25
Indianapolis *C5*	8.10	9.95	12.60	15.00	17.95
New Castle, Pa. *B4*	7.95	9.80	12.60	15.00	.....
New Haven, Conn. *D1*	8.40	10.10	12.90	15.30	.....
Pawtucket, R. I. *N7*	8.50	10.10	12.90	15.30	18.25
Pittsburgh *S7*	7.95	9.80	12.60	15.00	17.95
Riverdale, Ill. *A1*	8.05	9.80	12.60	15.00	17.95
Sharon, Pa. *S1*	7.95	9.80	12.60	15.00	17.95
Trenton *R4*	...	10.10	12.90	15.30	18.25
Wallingford *W1*	8.40	10.10	12.90	15.30	18.15
Warren, Ohio *T4*	7.95	9.80	12.60	15.00	17.95
Weirton, W. Va. *W3*	7.95	9.80	12.60	15.00	17.95
Worcester, Mass. *A5*	8.50	10.10	12.90	15.30	18.25
Youngstown *C5*	7.95	9.80	12.60	15.00	17.95

‡ On Application.

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	34.88	40.85	33.21	.....
	2½	12	46.98	55.01	44.73	.....
	3	12	54.24	63.53	51.66	.....
	3½	11	63.32	74.16	60.30	.....
	4	10	84.09	98.47	80.07	.....
National Tube	2	13	34.88	40.85	33.21	.....
	2½	12	46.98	55.01	33.73	.....
	3	12	54.24	63.53	51.66	.....
	3½	11	63.32	74.16	60.30	.....
	4	10	84.09	98.47	80.07	.....
Pittsburgh Steel	2	13	34.88	40.85	.....	.....
	2½	12	46.98	55.01	.....	.....
	3	12	54.24	63.53	.....	.....
	3½	11	63.32	74.16	.....	.....
	4	10	84.09	98.47	.....	.....

(Effective Oct. 9, 1956)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Unireated
Bessemer *U1*	5.075	6.00	6.35	....	....	....	....
So. Chicago *R3*	....	....	....	6.775	....	....	....
Ensley *T2*	5.075	6.00	....	....	....	....	....
Fairfield *T2*	....	6.00	....	6.775	....	6.025	....
Gary *U1*	5.075	6.00	....	....	....	6.025	....
Ind. Harbor *I3*	5.075	....	6.35	6.775	....	6.025	....
Ind. Harbor *Y1*	....	....	....	6.775	....	....	....
Johnstown *B3*	....	6.00	....	....	....	....	....
Joliet *U1*	5.075	....	6.35	....	....	....	....
Kansas City *S2*	....	....	....	6.775	....	....	....
Lackawanna *B3*	5.075	6.00	6.35	....	....	6.025	....
Lebanon *B3*	....	....	....	....	....	....	13.10
Minnequa *C6*	5.075	6.50	6.35	6.775	....	6.025	13.10
Pittsburgh *P5*	....	....	....	6.775	12.85	....	....
Pittsburgh *J3*	....	....	....	6.775	....	....	13.10
Seattle *B2*	....	....	....	9.275	....	6.175	13.16
Steelton *B3*	5.075	....	6.35	....	....	6.025	13.10
Struthers *Y1*	....	....	....	6.775	....	....	....
Torrance *C7*	....	....	....	....	....	....	....
Williamsport *S5*	....	6.15	....	....	....	....	....
Youngstown *R3*	....	....	....	6.775	....	....	....

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. ..... $14.50 to $14.75
Foundry, beehive (f.o.b. oven)
$17.00 to $18.00

Foundry, oven coke
Buffalo, del'd $30.75
Detroit, f.o.b. 29.50
New England, del'd 30.55
Seaboard, N. J., f.o.b. 28.75
Philadelphia, f.o.b. 28.50
Swedesland, Pa., f.o.b. 28.50
Painesville, Ohio, f.o.b. 29.50
Erie, Pa., f.o.b. 29.50
Cleveland, del'd 31.55
Cincinnati, del'd 28.59
St. Paul, f.o.b. 28.50
St. Louis, f.o.b. 30.50
Birmingham, f.o.b. 27.60
Milwaukee, f.o.b. 29.50
Lone Star, f.o.b. 25.50

ELECTRODES

Cents per lb f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	24.75	40	100, 110	10.70
20	72	24.00	35	110	10.70
16 to 18	72	24.50	30	110	10.85
14	72	25.00	24	72 to 84	11.25
12	72	25.50	20	90	11.00
10	60	26.50	17	72	11.40
10	48	27.00	14	72	11.85
7	60	26.75	12	60	12.95
6	60	30.00	10	60	13.00
4	40	33.25	8	60	13.30
3	40	35.25			
2½	30	37.25			
2	24	57.75			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
Cast elliptical, 18 in. or longer, 5000 lb lots 63.93
Electrodeposited 50.35
Brass, 80-20, ball anodes, 2000 lb or more 60.00
Zinc, ball anodes, 2000 lb lots 21.35
(for elliptical add 2¢ per lb)
Nickel, 99 pct plus, rolled carbon ... 90.50
(rolled depolarized add 3¢ per lb)
Cadmium $1.70
Tin, ball anodes and elliptical .$1.06 to $1.10

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum 80.50
Copper sulphate, 5 or more 100 lb bags, per cwt. 27.15
Nickel salts, single, 4-100 lb bags.. 35.25
Nickel chloride, freight allowed, 300 lb 46.50
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums 22.35
(Philadelphia price 22.60)
Zinc cyanide, 100 to 900 lb..... 55.55
Potassium cyanide, 100 lb drum N. Y. 48.00
Chromic acid, flake type, 1 to 20 100 lb drums 39.25

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolts	Full Container Price	Net Discounts 30 Containers	20,000 Lb.	40,000 Lb.
½" and smaller x 6" and shorter	55	58½	60½	61½
⅝" thru 1" x longer than 6"	46½	50	52½	54
Rolled thread carriage bolts ½ in. & smaller x 6 in. and shorter	55	58½	60½	61½
Lag, all diam. x 6" & shorter	55	58	60	61
Lag, all diam. longer than 6 in.	47	50	52	53
Plow bolts, ½" and smaller x 6" and shorter	54	57½	59	60

(Add 25 pct for broken case quantities)

Nuts, Hex, HP reg. & hvy.	Full Case or Keg Price
¾ in. or smaller	63
⅞ in. to 1 in. inclusive	59½
1⅛ in. to 1½ in. inclusive	64
1⅝ in. and larger	58
C.P. Hex regular & hvy.	
¾ in. and smaller	63
⅞ in. to 1½ in. inclusive	59½
1⅝ in. and larger	58
Hot Galv. Nuts (All Types)	
¾" and smaller	50
Semi-finished Hex Nuts	
¾ in. and smaller	63
⅞ in. to 1½ in. inclusive	59½
1⅝ in. and larger	58
(Add 25 pct for broken case or keg quantities)	
Finished	
1" and smaller	65

Rivets

	Base per 100 lb
½ in. and larger	$10.85
	Pct Off List
7/16 in. and smaller	26⅓

Cap Screws

	Discount (Packages) Bright Treated	H. C. Heat
New std. hex head, packaged		
⅝" diam. and smaller x 6" and shorter	47	34
¾", ⅞" and 1" diam. x 6" and shorter	31	13
⅝" diam. and smaller x longer than 6"	18⅓	+1
¾", ⅞" and 1" diam. & longer than 6"	6⅓	+19⅓

	C-1018 Steel Full-Finished Cartons	Bulk
¼" through ⅝" dia. x 6" and shorter	47	63
¾" through 1" dia. x 6" and shorter	31	51⅓

Minimum quantity—¼" through ⅝" diam., 15,000 pieces; 1/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts,

Plain Finish	Quantity	Discount Mach. Screws	Stove Bolts
Cartons		19	31
Bulk			
To ¼" diam. incl.	25,000-200,000	9	54
5/16 to ½" diam. incl.	15,000-100,000	9	54
All diam. over 3" long	5,000-100,000	—	54

Machine Screw & Stove Bolt Nuts

	Quantity	Discount Hex	Square
In cartons		16	19
In Bulk ⅝" diam. & smaller	15,000-100,000	7	9

CAST IRON WATER PIPE INDEX

Birmingham	119.0
New York	131.4
Chicago	133.4
San Francisco-L. A.	140.2

Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1 issue. Source: U. S. Pipe and Foundry Co.

REFRACTORIES

Fire Clay Brick *Carloads per 1000*

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5.00)	$128.00
No. 1 Ohio	128.00
Sec. quality, Pa., Md., Ky., Mo., Ill.,	114.00
No. 2 Ohio	98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $2.00)	20.00

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$140.00
Childs, Hays, Pa.	145.00
Chicago District	150.00
Western Utah	144.00-165.00
California	170.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	150.00-157.00
Silica cement, net ton, bulk, Latrobe	26.50
Silica cement, net ton, bulk, Chicago	24.00
Silica cement, net tons, bulk, Ensley, Ala.	25.50
Silica cement, net ton, bulk, Mt. Union	23.00
Silica cement, net ton, bulk, Utah and Calif.	35.00

Chrome Brick *Per net ton*

Standard chemically bonded, Balt.	$98.00
Standards chemically bonded, Curtiner, Calif.	108.00
Burned, Balt.	93.00

Magnesite Brick

Standard Baltimore	$121.00
Chemically bonded, Baltimore	109.00

Grain Magnesite St. ⅜ to ⅛-in. grains

Domestic, f.o.b. Baltimore in bulk.	$69.40
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.	
in bulk	43.00
in sacks	49.00

Dead Burned Dolomite *Per net ton*

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.00
Midwest	16.35
Missouri Valley	15.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh

Swedish sponge iron f.o.b. Riverton, N. J., ocean bags	8.50¢
Canadian sponge iron, Del'd in East, carloads	9.5¢
Domestic sponge iron, 98+% Fe, carload lots	8.5¢
Electrolytic iron, annealed, imported 99.5+% Fe	27.5¢
domestic 99.5+% Fe	26.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe	57.0¢
Electrolytic iron melting stock, 99.84% pure	22.0¢
Carbonyl iron size 5 to 10 micron, 98%, 00.8+% Fe	86.0¢ to $1.55
Aluminum freight allowed	35.00¢
Brass, 10 ton lots	37.50¢ to 50.00¢
Copper, electrolytic	59.50¢
Copper, reduced	59.50¢
Cadmium, 100-199 lb, 95¢ plus metal value	
Chromium, electrolytic 99.85% min. Fe .03 max. Del'd	$5.00
Lead	8.90¢ plus metal value
Manganese	70.0¢
Molybdenum, 99%	$3.35 to $3.85
Nickel, unannealed	$1.00
Nickel, annealed	$1.06
Nickel, spherical, unannealed #80	$1.13
Silicon	42.50¢
Solder powder	7.0¢ to 9.0¢ plus met. value
Stainless steel, 302	99.0¢
Stainless steel, 316	$1.35
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	$4.50
Zinc, 10 ton lots	18.75¢ to 32.50¢



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Stocks maintained of:
Rex High Speed Steel . . . .ALL grades of Tool Steel (including Die Casting Die and Plastic Mold Steel, Drill Rod, Tool Bits, and Hollow Tool Steel Bars) . . . Stainless Steel (Sheets, Bars, Wire, Billets, Electrodes) . . . Max-el, HY-Tuf, AISI Alloy . . . Onyx Spring, Hollow Drill Steel and other special purpose steels.

CRUCIBLE WAREHOUSE SERVICE

Crucible Steel Company of America

General Sales Offices, The Oliver Building, Mellon Square, Pittsburgh 22, Pa. Branch Offices and Warehouses: Atlanta • Baltimore • Boston • Buffalo • Charlotte Chicago • Cincinnati • Cleveland • Dallas • Dayton • Denver • Detroit • Harrison • Houston • Indianapolis • Los Angeles • Milwaukee • New Haven • New York Philadelphia • Pittsburgh • Portland, Ore. • Providence • Rockford • San Francisco • Seattle • Springfield, Mass. • St. Louis • St. Paul • Syracuse • Toronto, Ont.

Ferroalloy Prices

(Effective Oct. 9, 1956)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C ...	41.50	0.20% C ...	38.50
0.03% C ...	41.00	0.50% C ...	38.25
0.06% C ...	39.50	1.00% C ...	37.50
0.10% C ...	39.00	1.50% C ...	37.35
0.15% C ...	38.75	2.00% C ...	37.25

4.00-4.50% C, 67.70% Cr, 1-2% Si.. 37.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 27.75
0.025% C (Simplex) 34.75
0.10% C, 50-52% Cr, 2% max Si.... 35.75
8.50% max. C, 50-55% Cr, 3-6% Si. 24.00
8.50% C, 50-55% Cr, 3% max Si.... 24.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max 0.10% C price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.31
0.50% max. C	1.31
9 to 11% C, 33-91% Cr, 0.75% Fe..	1.40

Electrolytic Chromium Metal

Contract prices per lb of metal 2" x D plate (⅝" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	$1.29
Ton lots	1.31
Less ton lots	1.32

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.

Carloads	44.65
Ton lots	48.95
Less ton lots	51.45

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.
30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads	25.65
Ton lots	27.95
Less ton lots	29.45

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	24.25
Ton lots	26.15
Less ton lots	27.15

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr. 20% Fe ¼ in. x 12 mesh.

Ton lots	20.15
Less ton lots	21.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19½ Si, 8-11% Mn, packed.

Carload lots	17.30
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 43 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.: Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.75
Johnstown, Pa.	11.75
Sheridan, Pa.	11.75
Philo, Ohio	11.75
S. Duquesne	11.75

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.

Briquets, delivered, 66 pct Mn:

Carloads, bulk	13.90
Ton lots packed	16.30

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$97.50
19 to 21%	3% max.	99.50
21 to 23%	3% max.	102.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	33.00
Ton lots	35.00
250 to 1999 lb	37.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn... 24.15

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	35.80	38.60	39.80
0.07% max. C	33.75	36.55	37.75
0.10% max. C	33.00	35.80	37.00
0.15% max. C	32.25	35.05	36.25
0.30% max. C	30.75	33.55	34.75
0.50% max. C	30.25	33.05	34.25
0.75% max. C, 80.85% Mn, 5.0-7.0% Si....	27.25	30.05	31.25

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b shipping point.

Carloads bulk	12.95
Ton lots	14.60
Briquet contract basis carloads, bulk, delivered, per lb of briquet.....	14.40
Ton lots, packed	16.80

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $100.00 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton lots	Carloads
96.50% Si, 2% Fe ...	23.95	22.65
98% Si, 0.75% Fe	24.45	23.15

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si. briquets.

Carloads, bulk	7.55
Ton lots, packed	10.35

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si ...	13.50	75% Si ...	16.40
65% Si ...	15.25	85% Si ...	18.10
	90% Si. ...	19.50	

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots .	2.40	3.30	4.55

Ferrovanadium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.

Openhearth	3.20
Crucible	3.30
High speed steel (Primos)	3.40

Alsifer, 20% Al, 40% Si, 40% Fe, Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound Contained Mo. $1.28

Ferrocolumbium, 50-60%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb con't Sb plus Ta..... $4.95

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.54

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton $90.00
10 tons to less carload $110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y. freight allowed, carload, per net ton $200.00

Ferrotungsten, ¼ x down, packed, per pounds contained W, ton lots, delivered $3.45

Molybdic oxide, briquets, per lb contained Mo, f.o.b. Langeloth, Pa. $1.32
bags, f.o.b. Washington, Pa. Langeloth, Pa. $1.30

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump	17.50¢
Ton lots, packed lump	19.50¢
Less ton lots	20.00¢

Vanadium oxide, 86-89% V_2O_5 contract basis, per pound contained V_2O_5 ..... $1.38

Zirconium contract basis, per lb of alloy
35-40% f.o.b. freight allowed, carloads, packed ..... 27.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3.14%, Si 40-45%, per lb contained 2.... $5.25

Bortam, f.o.b. Niagara Falls
Ton lots, per pound ..... 45¢
Less ton lots, per pound ... 50¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed
Ton lots per pound ..... 14.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots ... 1.20
F.o.b. Wash., Pa. Niagara Falls, N. Y., delivered 100 lb up

10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over

No. 1	$1.05
No. 79	50¢

Manganese-Boron, 75.00% Mn, 15.20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	$1.46
Less ton lots	1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots $2.05



Keystone Aluminum Conductor System Installed at Penna. R.R. Shops

ASSURE 7 WAY SAVING IN WEIGHT...POWER...LABOR

THIS IS AN immense project—the new car repair shop of the Pennsylvania Railroad. The shop is 2760 ft. long; 15 overhead cranes are required with capacities up to 25 tons. To furnish electrical connections for the cranes two 3-rail Keystone Aluminum Conductor Systems, each running the full length of the shop, were specified and installed.

Keystone was judged best qualified to meet the rigid conditions required of this installation. It was selected because it would . . .

SAVE TRANSFORMERS—Three installations needed with steel conductors are eliminated with Keystone Aluminum Conductor System.

SAVE FEEDER RUNS—With this non-magnetic system, all but the center tap is eliminated.

SAVE BOOSTER CABLES—System capacity permits satisfactory operation ¼-mile from feeder without boosters.

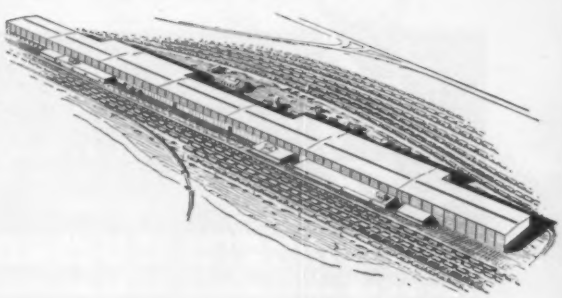
SAVE CAPACITY—Compact design permits close conductor spacings, minimizing impedence drop, reducing conductor size.

SAVE ENGINEERING COSTS—Integrated package design, factory assistance reduce time and effort.

SAVE INSTALLATION COSTS—Lightweight components, factory prefabrication, foolproof design cut erection time and cost.

SAVE OPERATING COSTS—Adequate voltage supply assures maximum crane operating speeds, reduces motor overloads. Protected contact surfaces eliminates shutdowns on exposed systems.

Keystone Aluminum Systems are now operating countrywide on AC and DC runways from 50 to 2760 ft. long, and on ore bridges and unloaders. Standard components range from 500 to 1000, 2000, 3000 and 6000 amp. capacity.



NEW SAMUEL REA SHOP at Hollidaysburg, Pa. where 50 steel hopper and gondola cars will be rebuilt each day. Large photo above shows 5 of the 15 overhead cranes, 2760-ft. runway; insert shows close-up of Keystone three-rail collector assembly. The Harry F. Ortlip Company of Philadelphia, specialists in railroad engineering and one of the largest electrical construction firms in the East, made the installation for Pennsylvania Railroad.

HKP

Electric Service Works

DELTA-STAR ELECTRIC DIVISION, H. K. PORTER COMPANY, INC.

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ALL SIZES, pressed . . rolled . . extruded . . forged to accurate specifications from carbon, alloy, stainless steels and special metals. Modern metallurgical, die, heat-treating and rough machining facilities.

Over 50 years of forging design and development

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CANTON, OHIO

ARMSTRONG *Drop Forged* HOIST HOOKS

Correctly engineered, drop forged and heat treated. Strong—max. load is 4 times rated "safe work load"; elastic limit approximately twice rated load. Inside hook sizes from ¾" to 4". Capacities ½ to 25 tons. For safe dependable service . . . specify ARMSTRONG Hoist Hooks. Write for Catalog.

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famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

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SET SCREWS • MILLED STUDS
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more and more manufacturers are saying: "Let's use

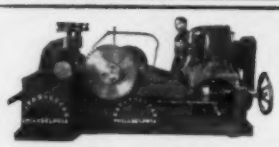
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MANUFACTURING CO. ERIE, PA.



Cutting Off Machines for Sawing All Kinds of Metals

THE ESPEN-LUCAS MACHINE WORKS
FRONT AND GIRARD AVE., PHILADELPHIA, PENNA.

JANUARY 3

Metalworking's Growing Markets

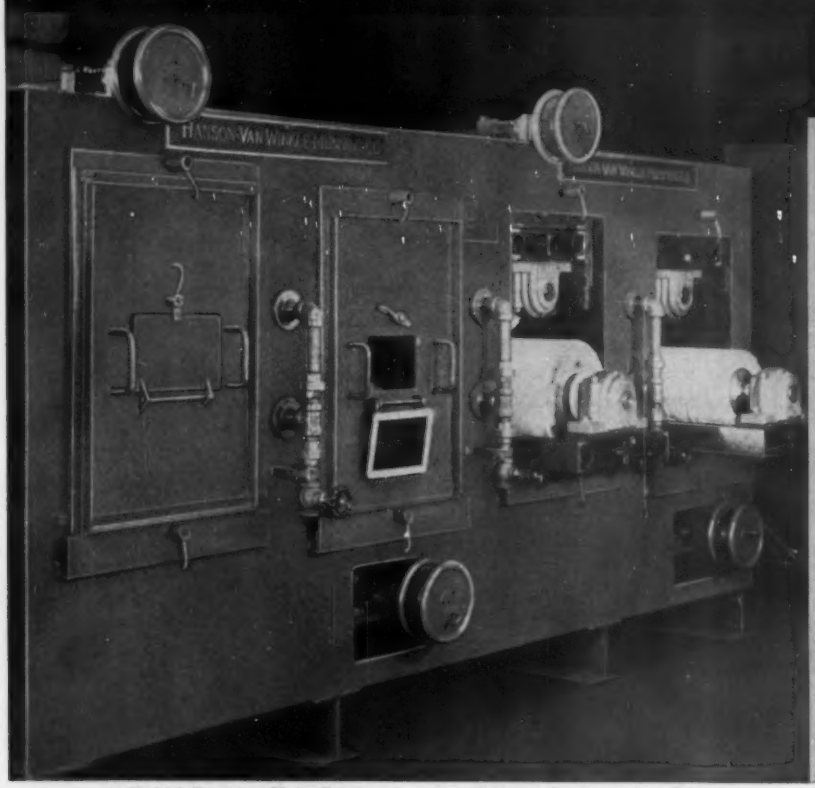
is the theme of the 1957 IRON AGE Annual Issue

MORE THAN 100 FACT-FILLED PAGES will be devoted to this urgent subject.

COVERED IN DETAIL will be . . . the 1957 Market *(forecast of markets for all leading metals);* Markets for Metalworking *(market outlook for more than a score of metalworking industries, and major articles on aluminum, copper, steel);* New Customers—5 Every Minute *(effects of population growth, geographic trends on expansion and plant location);* America's No. 1 Customer *(where spending emphasis of Uncle Sam's "billions in business" will be);* America's No. 1 Information Source *(where to find your best marketing information);* PLUS . . . Production and Price Data, Trade Association Directory, and other reference—value features essential to metalworking management planning.

The IRON AGE

CONTINUOUS STRIP AND SHEET METAL PROCESSORS



cut cleaning time to a fraction with this automatic H-VW-M SCRUBBER UNIT

H-VW-M Scrubber Unit. Brush units are pulled out for inspection. In a matter of minutes they could be replaced, if necessary with new brushes.

...and no down time either! Brushes are replaced easily while unit is in operation!

H-VW-M Scrubber Units—which adapt to fit into any system—are equipped with an exclusive, patented device that permits replacement of brushes *while the unit is running*. Just turn a few bolts, slide worn brush out, and insert replacement. Not a moment's production time is lost!

Add the advantages of this remarkable new feature to the enormous savings you'll realize in cleaning, reworking and inspection time, and you'll see why the rugged, efficient H-VW-M Scrubber Unit has no equal.

Get more facts about H-VW-M Scrubbers, with their exclusive easy-brush-replacement feature, by writing today for Bulletin HB-100.

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Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

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FREIGHT CAR REPAIR PARTS
For All Types of Cars

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Diesel, Steam, Gasoline, Diesel-Electric

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30 Cupola Type, Steel Underframe
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6,000- 8,000- and 10,000-Gallon
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"ANYTHING containing IRON or STEEL"

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Supply's the Hitch . . . The inventory problem continues to hold back fresh sales spurts in the Midwest, where volume of inquiries is continuing to climb. The main problem, however, is one that can't be licked. There just aren't enough good tools to meet demand. Buyers are combing defense machine tool stocks where surplus equipment has been offered for sale, are active at all plant auctions, and went over the automotive material closely, but there still aren't enough tools to meet demand.

Tool room equipment, a slow ground gainer as the used machine tool industry came out of its seasonal summer quiet spell, is now regarded by many as the tightest part of the overall machine tool picture. There have been indications that the situation on machine tools of late vintage is now so tight that some dealers are holding back on sales of late equipment in stock for two good reasons. First, their long term accounts are going to need them later in the fall and the dealer wants to be able to give delivery. Second, with the current hitch upward in prices, a tool on the display room floor is as good as money in the bank.

For Rent Only . . . One indicator in the scantiness of the used tool supply is the continuing gain in rentals of tools to fairly large industrial concerns. This has been climbing steadily since August and has thus far given no indication of a slowdown in its present rate of rise. The rise in rentals is not entirely attributable to scant supplies of late model used machine tools, however. Whatever the Federal Reserve may say to the contrary, some industries are hard put for working capital, can't find sufficient money for loan, and are turning to machine rental as a short-term way around the current money shortage.

What They Want . . . Shapers, tool room lathes, milling machines, pressbrakes, compressors, shears, and other general purpose equipment are being sought at the moment with an eagerness that was reserved for heavier, high-production equipment just a few months ago.

A number of dealers and some rebuilders will argue that business levels at the moment aren't really fire-hot, that if anything there seems to be a momentary lull in actual sales, even though the number of inquiries they receive continues high. Under pressure, most of these will admit that the business was there, they just didn't have the piece of equipment needed and weren't able to lay their hands on it in time to meet the customer's delivery requirements.

From Day-to-Day . . . Some rebuilders even argue that business is not a backlog affair, that it is a day-to-day affair. But this group, too, will admit that if they could build up their stocks of equipment for quick sale, their backlog would be in better shape.

Where to Get Them? . . . What's more critical, despite the mild increase in the number of used tools being offered by defense agencies and the automotive industry, and the large number of metalworking plants who've revised their production lines and replaced tools this year, there is very little hope among most Midwest dealers that they'll be able to boost their floor-stocks of equipment to the levels justified by current demand.

Generally—business is good, if you have the material to sell.

CONSIDER GOOD USED EQUIPMENT FIRST

BENDER & STRAIGHTENER
#4 H & J, Capacity 15" I-beams, 9" Girder Rail, 100 lb. Tee Rails, Motor Drive
BENDING ROLLS
6' x 3/16" Niagara Initial Type
8' x ½" Webb 129-V Vertical
12' x ¾" Southwark Pyramid Type
10' x ⅝" Niles Pyramid Type
20' x 1" Hilles & Jones Pyramid Type
BRAKES—LEAF TYPE
12' x ¼" Dreis & Krump
12' x ⅛" Dreis & Krump Motor Driven
BRAKES—PRESS TYPE
10' x ⅛" Superior Hydraulic, NEW
12' x ⅛" Superior Hydraulic, NEW
CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton P&H	29' Span	230 Volt D.C.
5 ton Whiting	48' Span	220/3/60 A.C.
5 ton Shaw	56' Span	230 Volt D.C.
10 ton Cyclops	40' Span	220/440 A.C.
10 ton Niles	79' Span	220 Volt A.C.
15 ton P&H	46' Span	230 Volt D.C.
15 ton Morgan	70' Span	220 Volt A.C.
25 ton Cleveland	70' Span	220 Volt A.C.
25 ton L-B Incl. 300 ft. Runway	75' Span	220/3/60 A.C.
60 ton Modern	66' Span	220/3/60
80 ton Niles	72' Span	230 Volt D.C.
120 ton Niles	63' Span	440/3/60 A.C.

CRANE TROLLEY
10 Ton P&H Type HMR 440/3/60—New 1952
FORGING MACHINES
1" to 5" Acme, Ajax, National
HAMMERS—BOARD DROP—STEAM DROP—STEAM FORGING—800 lb. to 20,000 lb.

LEVELLERS—ROLLER
44" Newbold, Nine Rolls 4" Dia.
48" Aetna Standard, 17 Rolls 3⅝" Dia.
54" Aetna Standard, 17 Rolls 3¾" Dia.
72" McKay, 17 Rolls 4¼" Dia.
PRESSES—HYDRAULIC
250 ton Bliss Double Acting 42" Stroke 48x49" Bed
500 ton Elmes 18" Stroke Lower Platen 38" x 66"
750 ton Baldwin Triple Acting Bolster 84" x 133"
1200 ton United Steam Hydraulic Forging Press
4500 Baldwin-Lima-Hamilton Hydr. Forging Press
PRESS—INCLINED
125 ton Beatty Open Back, 1½" Stroke, Area of Bed 28¾ x 20¾"
PRESSES—STRAIGHT SIDE
Clearing Model TF41500-200 Triple Acting Strokes 40, 32, 14", Bed Area 100" x 200"
100 ton Clearing, 14" Stroke, 28" x 36" Bed
250 ton Bliss, 16" Stroke, 29 x 29 Bed
250 ton Toledo, 6" Stroke, 36 x 72" Bed
PRESS—TOGGLE DRAWING
#268¼ D Toledo Double Crank Toggle Drawing 15" Stroke Bolster 108" x 60"
PUNCH & SHEAR COMBINATIONS
#44 x 48 Buffalo RAP, Capacity ½" x ⅝" Cleveland Style G Single End, 60" Throat
No. 1½ Buffalo Universal Ironworker
ROLLS—PLATE STRAIGHTENING
72" Bertsch, Seven Rolls 7" Dia.
86" H & J, Six Rolls 10" Dia.
12' Newbold, Nine Rolls 14" Dia.
ROLLING MILLS
10" x 16" Single Stand, Two High
12" x 14" Twelve Stand, Two High Strip Mill
12" x 16" Phila. Single Stand, Two High
15" x 30" G & M Single Stand, Two High
16" x 24" Farrel Two Stand, Two High
20" x 60" Two High Breakdown Mill
26" x 54" United Single Stand, Two High
26" x 72" H.P. Cold Rolling Mill
44" x 28" x 44" x 144" Three High
22" x 12" x 40" Lewis 3-High Shut Mill
SHEAR ANGLE
6" x 6" x ⅝" Hilles & Jones
SHEAR—BAR
#4 H & J Guillotine Type, Capacity 4" Round, 3½" Square, 12 x 1½" Flat.
SHEAR—GATE
80" x ⅜" Pels Model S T A U—22. All Steel
SHEARS—ROTARY
#23A Quickwork Whiting, 3/16" Capy.
#250 Kling, ¼" Capy.
SHEARS—SQUARING
8' x ¼" Niagara, LATE
10' x ¼" Cincinnati, LATE
16' x ¼" Toledo
SLITTERS
12" Blake & Johnson
52" Yoder #3, 5" Arbor, Motor Driven.
SWAGING MACHINE
#6½A Fenn, Capacity 2¼" Tube, 2¾" Solid 10" Die Length, Hydraulic Feed, LATE
TESTING MACHINES
60,000, 100,000, 200,000 Olsen & Riehle Universal 50,000 and 300,000 lb Compression
WELDING POSITIONER
14,000# Cullen Friestedt Model #140, 220/440
WIRE DRAWING MACHINE
BBS-13 Syncro Fine Wire Drawing Machine

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PACKAGE MILL DRIVES IN STOCK

1500—HP G.E. millmotor, rev., 600-VDC, 150/300 R.P.M., and 1250-KW G.E. M-G Set, 600-VDC with 1750-HP, .8 P.F. synchronous motor, 2300/4160-Volt, 3 phase, 60 or 25 cycle. Designed for variable voltage drive, all enclosed, forced ventilated.

IDEAL REEL DRIVES

(2)—600-HP Allis-Chalmers mill motors, 600-VDC, 300/600 R.P.M., with a 1200-KW, 600-VDC Westinghouse M-G Set, 1750-HP synchronous motor, 4160/2300-Volt, 3 phase, 60 cycle.

(2)—275-HP Westinghouse mill type motors, 230-VDC, 425/850 R.P.M., with 2 or 3-unit, 600-KW M-G Set, 250-VDC and 900-HP synchronous motor, 2300-Volt, 3 phase, 60 cycle.

(2)—100-HP Electro-Dynamic motors, 230-VDC, 450/1350 R.P.M., with 3-unit, 300-KW Allis-Chalmers M-G Set, 2300/440-Volt, 3 phase, 60 cycle.

SPECIAL

(2)—600-HP Westinghouse mill motors, 230-VDC, 110/220 R.P.M., anti-friction pedestal bearings.

MOTOR GENERATOR SETS

Qu.	K.W.	RPM	Make	Volts DC	Volts AC
1	1250	720	G.E.	600	2300/4160
1	1000	720	Whse.	600	2300/4160
1	500	1200	Whse.	125/250	2300/440
1	500	720	Cr. Wh.	575/600	2300
1	300	1200	Al. Ch. 3-unit	250	2300
1	300	1200	G.E.	250	2300
1	200	1200	Cr. Wh.	250	2300
1	200	1200	Elliott	125	4000/2300
1	200	900	G.E.	250	2300
1	175	1200	G.E.	250	440/220
2	150	1200	Whse. SK	250	2300/440
2	150	1200	Reliance	125	2300/440
1	150	1200	G.E.	250	2300
1	100	1200	Whse. SK	125/250	440/220
1	100	1200	Al. Ch.	250	4600/2300

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- 4" National Upsetter High Duty, guided overarm slide, air clutch
- Ajax & National Upsetters, suspended slide, 2½", 3", 4"; similar upsetters not suspended slide, ¾", 1", 1½", 2", 3"
- 5" Acme Upsetting & Forging Machines suspended slide, cam side die slide
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- #3 Abramson Bar & Tube Straightener
- Pels FV-75 Bar & Billet Shear, Cap. 7⅛" rd
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- 1600 Chambersburg Model F Board Drop Hammers, Roller bearing; double V-ways, Built 1943
- 1500 lb. Niles Steam Forging Hammer
- Bradley Hammers, various sizes, including 500# Upright
- Nazel Air Forging Hammers, #2-B, 5-N
- Williams White Bulldozers, #22, #3, #4, #25, #6, #29 U-type
- Landis Landmaco and other Landis Threading Machines from ⅜ to 4"
- Single and Double End Punches
- Angle Shear H. & J. 6 x 6 x 1"
- No. 3 Motch & Merryweather Saw, with Saw Grinder
- Wide assortment of heating treating furnaces, electric and oil

BOLT, NUT AND RIVET MACHINERY, COLD HEADERS, THREAD ROLLERS, THREADING MACHINES, TAPPERS, COLD BOLT TRIMMERS, SLOTTERS, HOT HEADERS AND TRIMMERS, COLD AND HOT PUNCH NUT MACHINES.

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GUARANTEED
ELECTRIC POWER EQUIPMENT

D. C. MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	2200	G.E.	MCF	600	400/500
1	1000	G.E.	MCF	600	350/700
1	940	Whse.	QM	250	140/170
1	800	Whse.		250	450/550
1	500	Whse.	CC-216	600	300/900
3	450	Whse.		550	415
1	250	G.E.	MPC	230	400/600
1	200	Whse.	CB-5113	250	400/800
1	150	G.E.		600	250/750
1	150	Cr. Wh.	65H	230	1150
1	150	Whse.	SK-151B	230	900/1800
1	120	G.E.	MFC	230	250/1000
1	125	Whse.	SK-183	230	850
2	100	Whse.	SK-181	230	450/1000
2	75	C.W.	53H-TSFC	230	860
1	50	G.E.	MD-412AE	230	550
1	50	Whse.	SK-131.5 B.B.D.P.	230	600/2200
4	30/40	Whse.	SK-131	230	500/1500

M-G Sets—3 ph. 60 Cy.

Qu.	K.W.	Make	RPM	D.C. Volts	A.C. Volts
1	3000(3U)	G.E.	514	600	4000/6900/13200
2	2000/2400	G.E.	450	250/300	2300/4600
1	1750/2100	G.E.	514	1100	4900/6900/
1	2000	G.E.	500 25cg	660	11000
1	2000	G.E.	514	600	2300/4600
1	1500	G.E.	720	600	6800/13200
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1	500	G.E.	900	540/540	4150
1	500	Whse.	900	125/250	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
1	3000	A.C.	OISC	3	23040x2304
1	2500	A.C.	Furnace	3	13800x147/113.5
1	2500	A.C.	OISC	3	34520x13800
4	2000	Whse.	OISC	3	6900x480
1	2000	Whse.	OISC	3	6900x2300/2982Y
3	1000	G.E.	HVDDJ	1	2400x480
1	800	G.E.	H	1	13800x460
3	1000	Wagner	OISC	1	13200x460
3	500	G.E.	H	1	2400/4800x480
1	500	Al. Ch.	OISC	1	4800x208
1	500	G.E.	OISC	1	13200x2300
3	667	G.E.	HD	1	13800x2300
3	500	Kuhl	OISC	1	13200x6600
3	333	G.E.	HS	1	7200x2400/4160Y
3	333	G.E.	HD	1	13200x2300
3	333	G.E.	HSWR	1	2300/4000x230/460
3	333	G.E.	H	1	6900x230/460
1	300	G.E.	HT	3	4160x480/277

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Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the ownership, management, and circulation of THE IRON AGE, published weekly at Philadelphia, Pa., for October 1, 1956.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, George T. Hook, Chestnut and 56th Streets, Philadelphia 39, Pa.

Editor, George F. Sullivan, Chestnut and 56th Streets, Philadelphia 39, Pa.

Managing Editor, Eugene C. Beaudet, Chestnut and 56th Streets, Philadelphia 39, Pa.

Business Manager, None.

2. The owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual member, must be given.)

Chilton Company, Chestnut and 56th Streets, Philadelphia 39, Pa.

Holders of more than 1 per cent of the capital stock outstanding of Chilton Company: Mary M. Acton, 260 Sycamore Avenue, Merion Station, Pa.; Mrs. Beulah Fahrendorf, 59 Drake Road, Scarsdale, New York; Dorothy S. Johnson, 1115 Fifth Avenue, New York, N. Y.; Estate of Mabel M. Musselman, 260 Sycamore Avenue, Merion Station, Pa.; Beneficiaries: Mary M. Acton and David Acton; J. Howard Pew, 1608 Walnut Street, Philadelphia, Pa.; J. N. Pew, Jr., 1608 Walnut Street, Philadelphia, Pa.; Mabel P. Myrin, 1608 Walnut Street, Philadelphia, Pa.; Mary Ethel Pew, 1608 Walnut Street, Philadelphia, Pa.; Alberta C. Sly, Executrix U/W of Frederick S. Sly, Deceased, 149-40 35th Avenue, Flushing, N. Y., Beneficiaries: Albert C. Sly, Alberta C. Sly and John E. Sly; Mary M. Acton and John Blair Moffett, Trustees U/W of Clarence A. Musselman, Deceased, 1608 Walnut Street, Philadelphia, Pa., Beneficiaries: Mary M. Acton and David Acton; Charlotte M. Terhune, 160 E. 48th Street, New York, N. Y.; Alberta C. Sly, 149-40 35th Avenue, Flushing, N. Y.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.) 28,295.

GEORGE T. HOOK, Publisher

Sworn to and subscribed before me this 18th day of September, 1956.

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(My commission expires January 7, 1959.)
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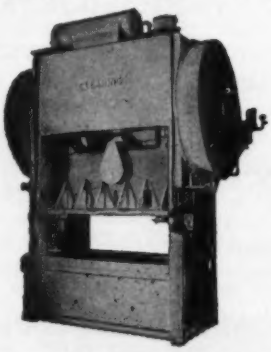
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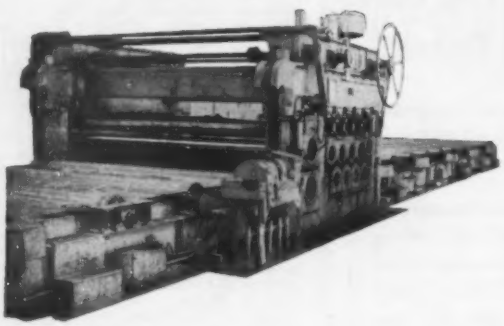


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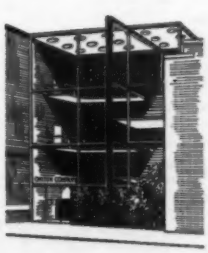
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METALWORKING BRIEFS

Ike Says "No" on Lower Watch Tariff

Tariffs on imported watch movements, increased by 50 pct in 1954, will not be cut for economic reasons. President Eisenhower agrees with the U. S. Tariff Commission that there is "not sufficient reason" to institute a formal investigation now. This means that higher watch tariffs will remain in effect without change. Office of Defense Mobilization continues its study of demand by U. S. watchmakers that even further steps should be taken to protect the industry on grounds of "essentiality."

Coal Prices Head Up

Soft coal prices took an initial step upward with announcement of Appalachian Coals, Inc., that prices of Southern produced coal would go up a minimum of 35¢ per ton. The increase, retroactive to Oct. 1, followed labor agreement of the Southern Coal Producers' Assn. and the United Mine Workers. Northern producers had not announced new prices, although their settlement preceded that of the Southern.

Income, Industrial Production Climb

National production of goods and services is now at a level of $414 billion annually. Chairman Arthur Burns, of the President's Council of Economic Advisers, reports this compares with the previous yearly record rate of $408 billion set in the second quarter. Personal income in August reached a yearly rate of $328.2 billion, $4 billion above the July rate and $19.5 billion over the previous year.

National Steel Offers Bond Issue

National Steel Corp. will sell $55 million of first mortgage bonds to the public to help finance its $140 million construction program. The company has asked the Securities and Exchange Commission, which must approve the action, for permission to register the bonds, which would be due in 1986.

Alumina from Clay Process Developed

The Anaconda Co. announces it has solved the problem of producing alumina from clay. The company is now in the process of constructing a pilot plant, from which it expects to develop a full-scale commercial plant to supply the company's total alumina requirements. The company has already optioned vast reserves of clay in the Moscow, Idaho, area. Alumina produced has been in substantial quantities and within specifications required for the material extracted from bauxite.

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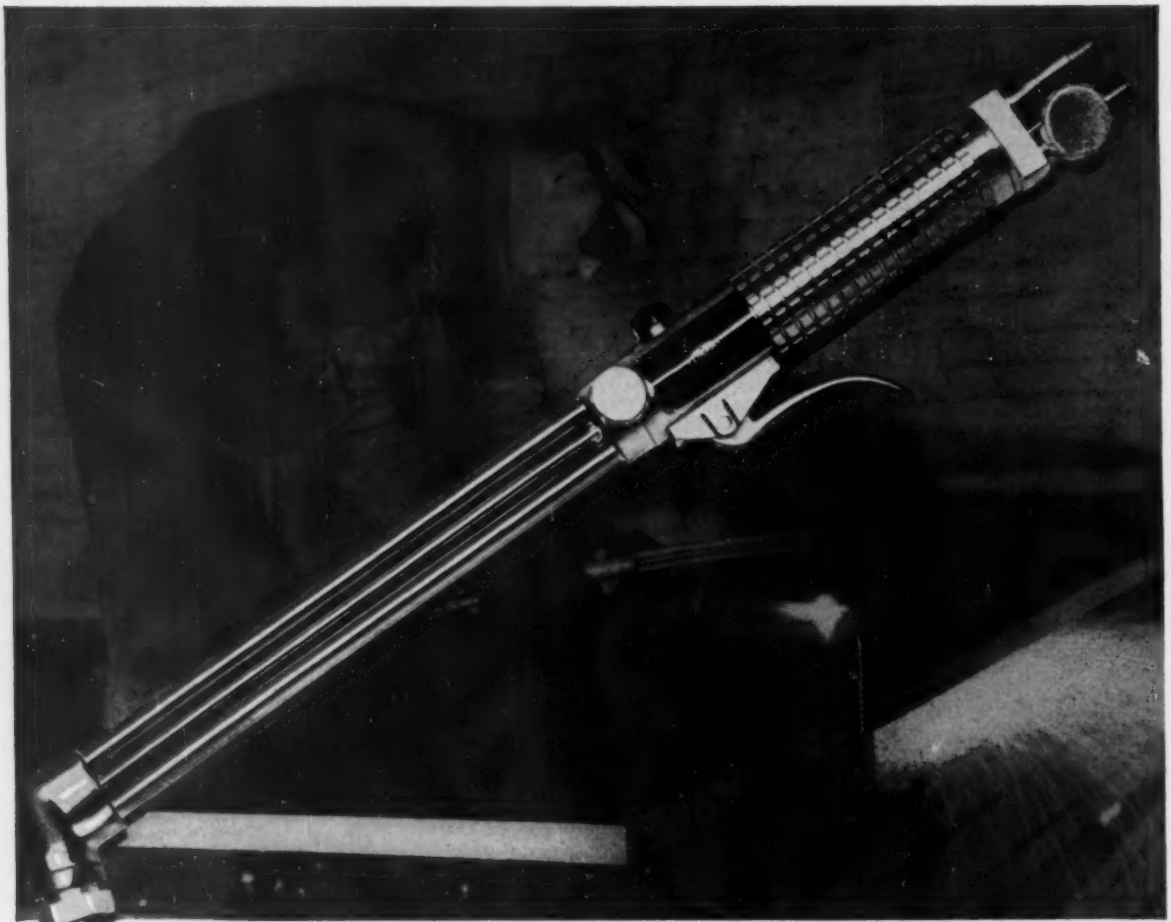
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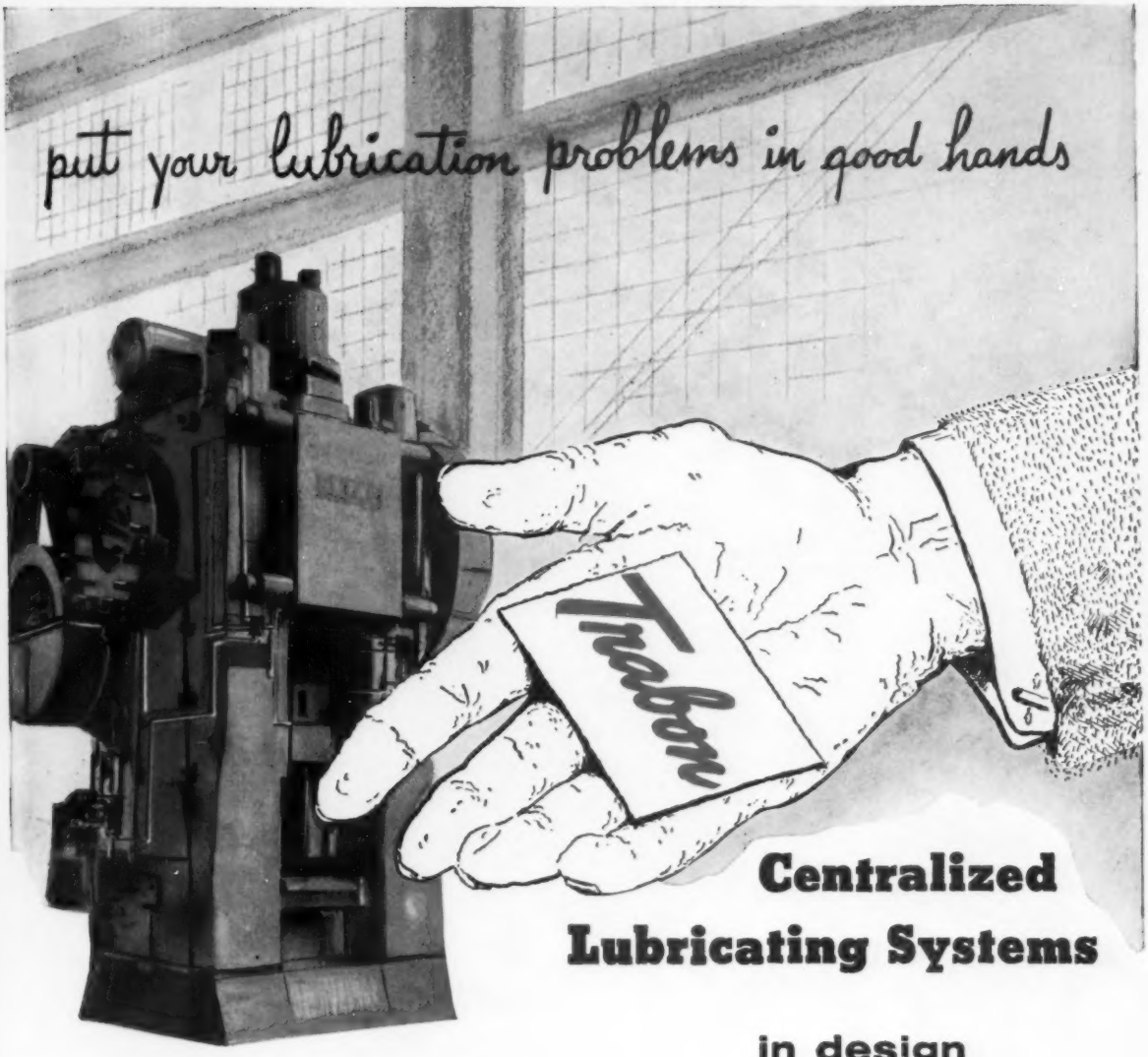
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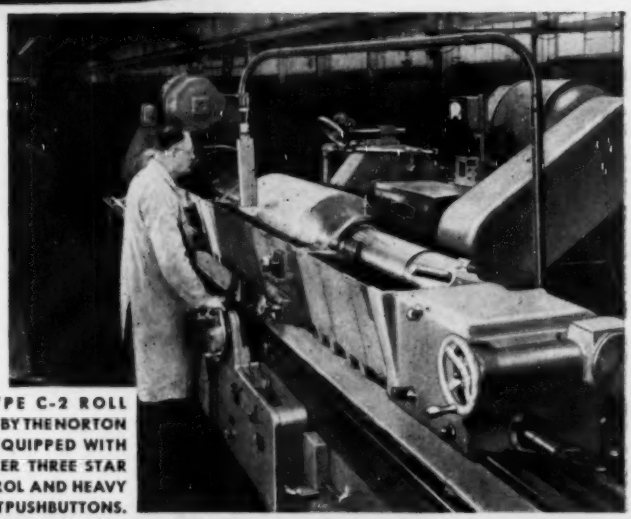
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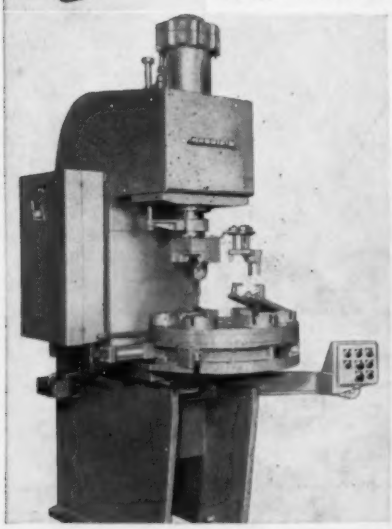
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